Instructions *for* Installing Modern Plumbing Systems

Sears, Roebuck *and* Co.
Chicago-Philadelphia-Dallas-Seattle

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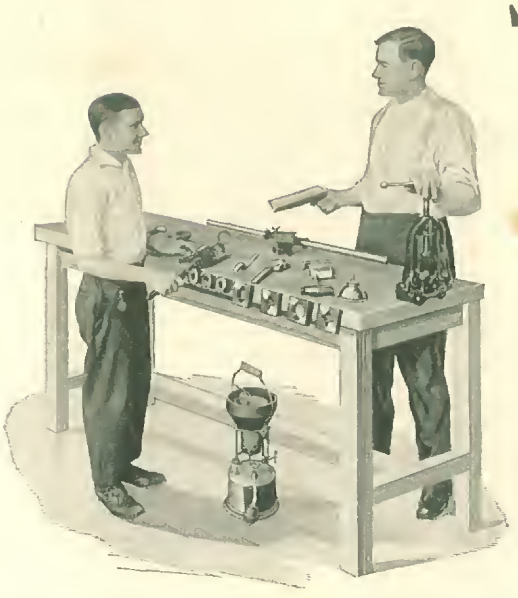

"Now we're all set, Son. We have the tools, we have the Instruction Book, and we have the hands. It looks to me as though ANYONE, even if he'd never laid a pipe in his life, could do pretty nearly a perfect plumbing job if he followed the instructions in this book and watched the illustrations. Everything seems perfectly plain to me. Let's get started."

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Instructions for Installing Modern Plumbing Systems

THE modern improved method of using wrought iron and cast iron pipe in plumbing installations, besides its other advantages, has made plumbing work so simple and easy that anyone who is at all handy can with a few simple directions do the work as well as an expert. This book gives the simple directions required by those who have never before done work of this kind. We show illustrations of a number of common installations which bring out all the principles of modern plumbing. With a few minor changes these can be made to apply to almost any building.

We repeat that it is easy to install plumbing with the help of these illustrations and directions. Many of our customers without previous experience have been able to install kitchen and bathroom plumbing in their homes with no other aid than these directions.

After reading the general advice and suggestions carefully, read the dictionary of plumbing terms on page 2. Roughing-in measurements, which give you the proper heights for faucets and traps, and the proper distances from floor and walls, will be found on pages 39 and 40.

If any of our directions are not entirely clear, or if there is any point on which you wish further advice, we invite you to write us. We shall be glad to give you any further information you may wish.

Plumbing Ordinances

In all cities and in most small towns there exist plumbing ordinances. A plumbing ordinance is a law governing the installation of plumbing. If there is a plumbing ordinance in your town or city you will be able to comply with it by following the instructions in this book. The object of these plumbing ordinances is to protect the public against inferior work and material, either of which would tend to menace the health of the occupants of the building as well as that of the general community. It is our endeavor at all times to comply with both the letter and spirit of these laws, appreciating as we do their purpose and value.

Be sure you comply with the plumbing ordinance in your community, if there is one, in any plumbing you do. Otherwise, the installation will not be passed by the city inspector. For tests such as are called for by most ordinances, see "Tests for Plumbing," bottom next column.

A Few General Suggestions

When selecting plumbing fixtures for your home make sure they are of sanitary design and of good quality. The cheapest method of installing plumbing is rarely the most economical in the end. Plenty of pure, fresh water, coming from sanitary fixtures properly installed, is almost as great an aid to health and happiness as the fresh air and sunshine.

It is not advisable to install plumbing fixtures in sleeping rooms.

The water pipes should be laid so that the water will drain freely from all parts of the system, leaving no pockets or traps where the water can gather and freeze. The pipe should also run as straight and direct as possible, as all turns stop the flow of the water to some extent. Be sure to set all fixtures level, but pitch the pipes.

The use of lead pipes under floors and in partitions is not advisable for various reasons, one of the most important of which is that rats often eat holes in it. Another objection to lead pipe is that it requires solder or wiped joints. A wiped joint is made by pouring molten solder over the joint and wiping it round and round with a cloth made for that purpose. This is extremely difficult for the beginner, and a slight jarring of the pipe while the joint is being wiped is likely to cause the solder to run into it. This leaves rough edges to catch lint, hair and other substances that in time will clog the pipe.

Use cast iron pipe for all underground house drains within the building. Although it costs a little more than tile it is safer from a sanitary standpoint and is less liable to cause trouble by clogging when settling or cracking, as sometimes happens when tile is used.

See that all joints and connections are made watertight and allow plenty of fall in the waste piping to carry off sewage rapidly. When making a turn in a cast iron pipe, if possible use eighth bends instead of quarter bends or square elbows. Eighth bends make the flow easier.

Drain pipe for refrigerators or other receptacles in which food is stored should not be connected direct with either soil or wrought iron waste piping from plumbing fixtures. They should drip into an open tray. This tray should be trapped with the lower end of the waste pipe from the tray discharging into a sink or other fixture that is in constant use.

Under no circumstances run the soil pipe vent from closet, sink or any other fixtures into a chimney instead of continuing it up through the roof.

All private water supplies, such as wells, springs, lakes or streams, should be at a safe distance from the sewer or septic tank to avoid polluting the water.

If possible, arrange all fixtures along one wall. Before the walls are plastered put in the "grounds," or solid boards, on which hang brackets for sink, lavatory and closet flush tank (see page 14).

Most of the plumbing terms shown on page 2 are doubtless familiar to the reader, but there may be a few that are not entirely clear. Read them over carefully so as to be familiar with the fittings and fixtures before reading the directions.

Tests for Plumbing

After the roughing-in material is installed, most plumbing ordinances require that a water test be applied. This is made by sealing all the openings of the waste and revent pipes and filling the stacks with water to the height of the increaser at the top. If the waste and revent pipe system is then found watertight and is passed by the inspectors or those who have power to pass on the test, the final test is made when the fixtures are installed, with either the smoke or peppermint test. In order to make sure that these tests will be satisfactory, it is necessary that a great deal of care be taken in calking the joints properly in the roughing-in, as well as properly applying the washers.

Illustrations and descriptions of most of the fittings mentioned in this book are shown on page 2.

Dictionary of Plumbing Terms

Basin Tee—Same as drainage tee. (See Draining Fittings.)

Bibb—A faucet, spigot or cock.

Bushing—A threaded fitting used to reduce the size of a pipe opening.

Compression Bibb—A faucet closed by a disc, forced down when the top is turned.

Coupling—A pipe fitting threaded inside at both ends, used to connect two pieces of wrought pipe.

Cross—A fitting shaped like a cross, with four openings.

Draining Fittings—Drainage elbows, tees, etc., are cast iron pipe fittings so designed as to give a uniformly smooth passage for waste water.

Eighth Bend—A soil pipe fitting which makes a bend or turn equal to one-eighth of a circle, or one-half a right angle.

Elbows—Fittings used to make turns or bends in pipe lines. Ordinary elbows make a right angle or square turn.

90-Degree Elbow—An elbow threaded inside at both ends, for making a right angle or square turn.

45-Degree Elbow—An elbow threaded inside at both ends, for making only one-half a right angle turn.

Foot Valve—A combination strainer and check valve placed on the end of the suction pipe of a pump. Acts as a strainer and keeps pump and suction pipe full of water.

Fuller Bibb—A faucet in which the water is turned off by a rubber ball forced into the opening when the handle is turned.

Gasket—A washer of rubber, leather or soft metal, used to make a tight connection between two parts of a union or other pipe fitting.

Hose Bibb or Faucet—One to which a hose may be coupled.

Lavatory—A washstand, wash basin or wash bowl.

Long Increaser—A fitting which is really a piece of soil pipe with one end smaller than the other to fit the hub of a smaller soil pipe.

Long Screw—A fitting used like a union for connecting two stationary pieces of pipe. Used almost entirely for waste water piping.

Nipple—A short piece of pipe threaded on both ends.

Pneumatic Tank—Same as pressure tank.

Pressure Tank—An airtight tank used in connection with water supply systems to store water under pressure. An air pressure tank.

Quarter Bend—A soil pipe fitting which makes a right angle or square turn.

Reducer—A fitting threaded inside at both ends, with one end smaller than the other. Used to connect two pipes of different sizes. A soil fitting is used for the same purpose.

Reducing Elbow—An elbow with one end smaller than the other.

Reducing Tee—A T-shaped fitting with one or two of the openings smaller than the third.

Revent—To ventilate plumbing fixtures by giving them a connection with the outside air—so when there is a suction in the drain caused by emptying one fixture, air will be drawn into the piping and prevent the water from being sucked out of the traps of the other fixtures.

Roof Flange—A fitting placed over a soil pipe where it extends through a roof to prevent rain coming in between the pipe and roof.

Roof Flashing—Another term for roof flange.

Sanitary Tee—A soil pipe fitting shaped like the letter T, with a long turn, side opening.

Shut Off Cock—Another name for stop cock.

Sill Cock—A faucet, threaded for hose connection, attached to the end of a water pipe extending through the sill or wall of a building.

Siphon—A bent tube or pipe through which water is raised from a higher level and discharged at a lower level by the weight of the water falling through the pipe. To siphon is to draw water from a higher to a lower level. Applied to plumbing drainage, it means drawing out the water in the trap of one fixture by emptying another fixture.

Soil Pipe—Cast iron pipe with hub connection; used for carrying waste water from plumbing fixtures to sewer or drain.

Soil Stack—A vertical line of soil pipe extending from the basement or ground up through the roof.

Stop Cock—A valve or cock for shutting off the water in a wrought iron pipe line.

Stop and Waste Cock—A stop cock with a side opening for draining one side of a pipe line when the water is shut off.

Street Elbow—An elbow threaded inside at one end and outside at the other.

Stub Bibb—A short flat compression laundry bibb or faucet.

Tapped—With threaded opening.

Tapped Increaser—A fitting for connecting wrought iron pipe to a large size cast iron soil pipe.

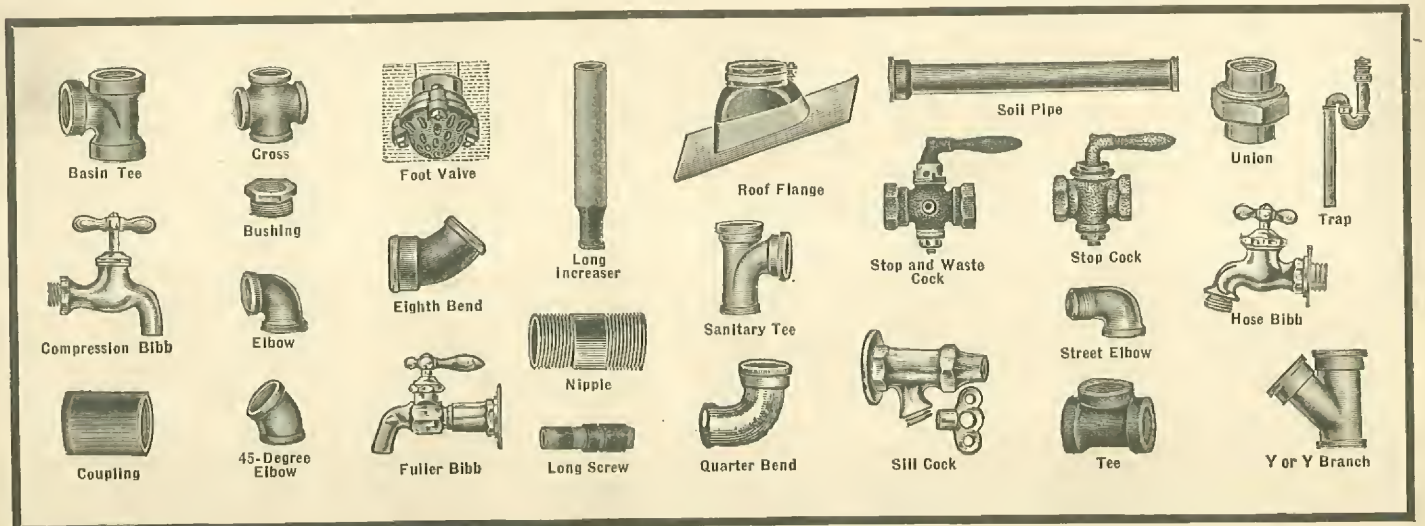
Tee—A pipe fitting shaped like the letter T, with three openings.

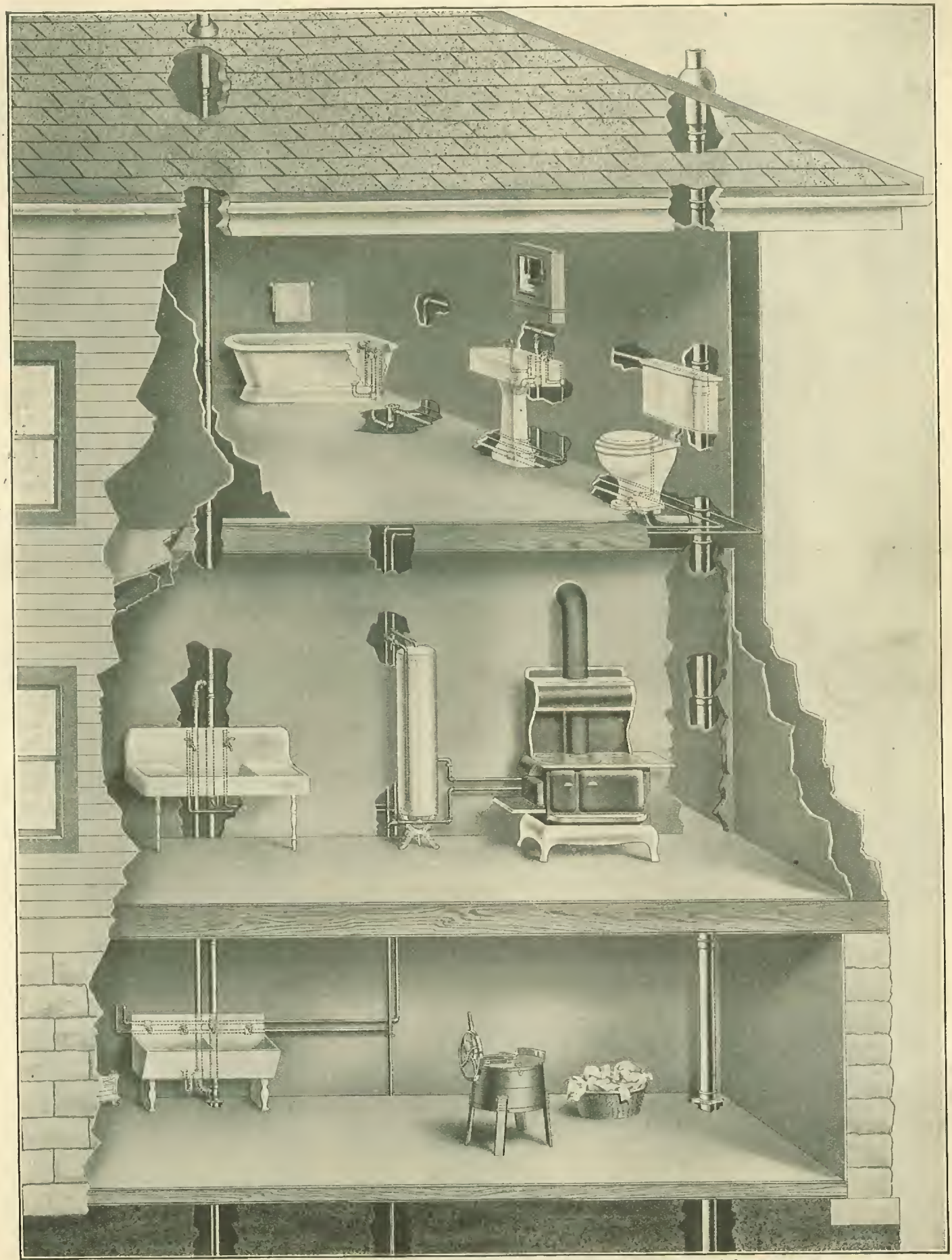
Trap—A U-shaped pipe or fitting which holds sufficient water to completely close the opening, thus preventing odors and gases from coming up through the drain pipe.

Union—A fitting for connecting two stationary pieces of pipe.

Vent—An opening to which a ventilating pipe can be connected.

Y or Y Branch—A fitting shaped like the letter Y with three openings.





Installation I—A Complete Plumbing Installation in a Two-Story Dwelling With Basement.

Directions for Installing Bathroom, Kitchen and Laundry Outfits in a Two-Story House With Basement

Installation No. 1, on page 3, shows a complete plumbing installation in a two-story dwelling. The three-piece bathroom outfit on the top floor consists of a 5-foot porcelain enameled iron bathtub with a model waste and overflow, square pedestal porcelain enameled lavatory with nickel plated trimmings (faucets, trap and supply pipes), and a siphon jet closet outfit consisting of a siphon jet bowl and a vitreous earthenware flush tank with nickel plated supply pipe to the floor. In the kitchen there is a one-piece porcelain enameled sink with a drain board on each end and nickel plated faucets and trap, and a 30-gallon galvanized iron range boiler, which is sufficiently large to furnish plenty of hot water for the use of the average family. The basement has a two-compartment composition granitine cement laundry tub furnished with stub laundry bibbs or faucets.

The traps of all fixtures in this illustration are revented or ventilated, that is, every trap is directly connected with the outside air in some manner. We shall explain this reventing more fully in the following pages. It is not absolutely necessary to revent all plumbing fixtures. In the following pages we show several examples of plumbing installations which do not include reventing. However, it is always best to revent whenever there are two or more fixtures, the waste of which runs into the same waste pipe, as this prevents the trap of one fixture being emptied by suction when another fixture is being flushed.

The range boiler in Installation No. 1 is connected to a coil in the kitchen range which heats the water. The water could be heated equally well in a gas water heater, a furnace coil or a coal burning tank heater. Diagrams showing the proper connection of a range boiler with any of these other heaters are shown on page 8.

Although the system of installing the fixtures as shown in Installation No. 1 will meet the requirements of almost any plumbing ordinance, it is not designed after any particular ordinance. Possibly the plumbing ordinance of your town requires some slight changes in this installation. We can furnish material to conform with any plumbing ordinance. All we require is a copy of the ordinance you wish to follow.

Installing the Roughing-In as per Installation No. 1

Roughing-in means installing pipe only before the fixtures are put in. We shall assume that all the pipe in the kitchen and bathroom is to be concealed in the wall. In order to do the roughing-in before the fixtures arrive, it is necessary to have the so called roughing-in measurements. These measurements give you the exact heights of faucets, traps, etc., and the distances from floor and walls to traps, closet waste, etc. The roughing-in measurements for all plumbing fixtures sold by us will be found on pages 39 and 40.

Photo No. 1.

How to Install the 4-Inch Soil Pipe, Waste Pipe and Revents for Bathroom

In the roughing-in for plumbing fixtures it is usual to start with the vertical soil pipe or stack which receives the drainage from the water closet and other bathroom fixtures. You start with the pipe rest at the floor in the basement. In Installation No. 1 in the lower right hand corner, and in Photo No. 1 we show the pipe rest on the floor itself, with a piece of pipe dropped through a hole cut in the floor. If the floor is not laid, you can notch the top of two joists and place the rest in the notches as shown in Photo No. 2. When the joists are not as convenient as shown in Photo No. 2 it may be necessary to block out one or both of the joists with 2x4's to form a bearing for the rest; in other words, to nail pieces of wood as cleats to the joists, as shown in Photo No. 3.

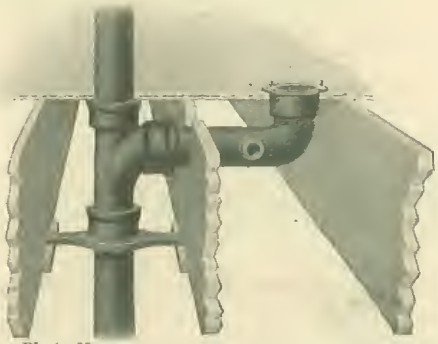


Photo No. 3.

After you have securely fastened the pipe rest, drop a length of 4-inch soil pipe through the rest as shown in Photo No. 2. You now have a foundation on which to build the stack up to the roof. If you refer to the illustration of Installation No. 1, the description will be clear. Into the hub of the pipe in the rest, calk another length of soil pipe. Directions for calking soil pipe will be found on page 37. Be sure to fasten the pipe securely before calking, so that the lead will run straight. If you calk still another length of soil pipe into the length before mentioned, this will probably bring you to within 3 or 4 feet of where the tee for the closet connection is to be placed, under the bathroom floor.

Photo No. 4.

To get all measurements exact, hold the tee, or fasten it temporarily, the exact height that will be required for connecting it with the closet bend. The proper height is to have the top of the side opening about 1 inch below the bathroom floor, as shown in Photo No. 4. With a stick measure from the inside of the hub of the 4-inch soil pipe coming up from the floor below to the lower end of the tee. Cut off a piece of soil pipe of the length you have measured. Directions for cutting both extra heavy and standard soil pipe are given on page 37.

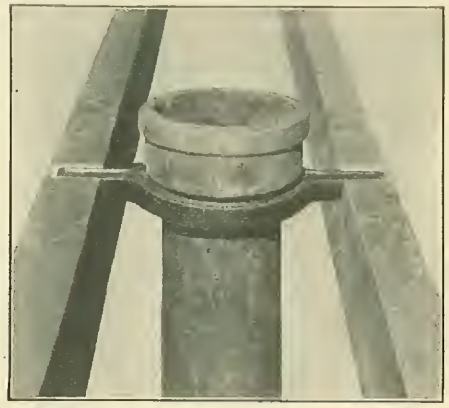


Photo No. 2.

Next calk the tee into the piece of soil pipe you have just cut. Temporarily set this pipe and tee in position and be sure the side opening of the tee faces out into the room in such a direction that when the closet bend is calked into it the closet bowl may be set over the bend in the proper position in the room. It is now necessary to have the correct distance from the finished wall to the center of the opening of the bend over which the closet will set. (See pages 39 and 40 for the correct measurements for your closet.)

It may be necessary to cut off the closet bend to the required length. Directions for cutting it will be found on page 37. Now calk the bend into the side opening of the tee, being sure that it is held straight so the floor flange that holds the bowl will set level on the floor when in position. You now have a length of soil pipe into which is calked a tee, and in the tee a closet bend. Drop this pipe with the tee and bend on it down into

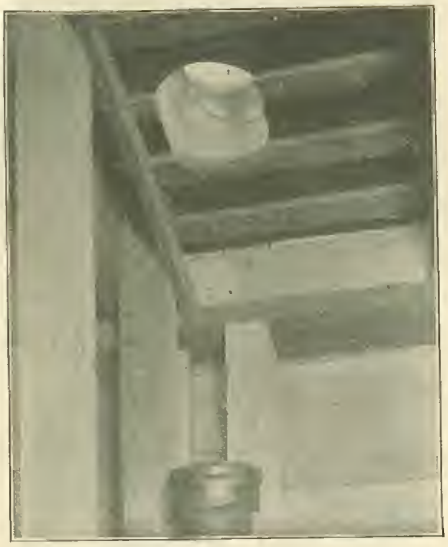


Photo No. 5.

the 4-inch soil pipe coming up from the floor below. Then fasten the closet bend and tee securely so they will not shift while you are calking the end of the pipe into the hub of the lower pipe.

You are now up to the bathroom floor with the soil stack. Next calk a length of soil pipe into the top of the tee, and into the top of this pipe calk a 4x1½-inch revent tee, shown on the diagram behind the closet tank. From the top of this tee continue the stack of soil pipe up to within 8 or 10 inches of the roof, as shown on the diagram and in Photo No. 5. Next put a roof flashing on the roof, as shown in Photo No. 6. Then slip a long increaser up through the roof flashing, as shown in Photo No. 7. Drop the lead ring over the increaser joint on the roof flashing, as shown in Photo No. 8. Then beat the lead ring tight against the increaser so as to make a watertight joint, as shown in Photo No. 9. The stack of soil pipe is now complete.

Roughing-In Waste Pipe for Bathtub and Lavatory

After the soil pipe is complete, the next step is to install the waste pipe which is to take the waste water from the bathtub and lavatory, see Installation No. 1. Into the closet bend screw a 1½-inch nipple with a 1½-inch 45-degree drainage elbow on the end of it. Then into the 45-degree elbow

Photo No. 8.

screw another short nipple with another 45-degree drainage elbow on the end of it. In this manner you will form an offset to lift the drain pipe for the lavatory and bathtub to a position just below the floor. Into the second 45-degree elbow screw a piece of 1½-inch pipe with a 1½-inch drainage tee on the end of it, the pipe being long enough to bring this drainage tee immediately below the center of the trap of the lavatory. Into the drainage tee screw another piece of 1½-inch pipe with another drainage tee on the end of it, this last pipe to be long enough to reach from the lavatory to within about 6 inches of where the drum trap for the bathtub will be set. The tee here is the revent tee for the bathtub drum trap. Into the further end of this tee screw a 1½-inch nipple about 6 inches in length, and on this nipple screw the side opening of the bathtub drum trap. Photo No. 10 shows these connections.

Next into the bottom of the drum trap screw a drainage street elbow. Into the elbow screw a 6-inch nipple, and into the nipple an ordinary drainage L. See Photo No. 11. The last elbow is turned up toward the floor, as it is to receive the waste from

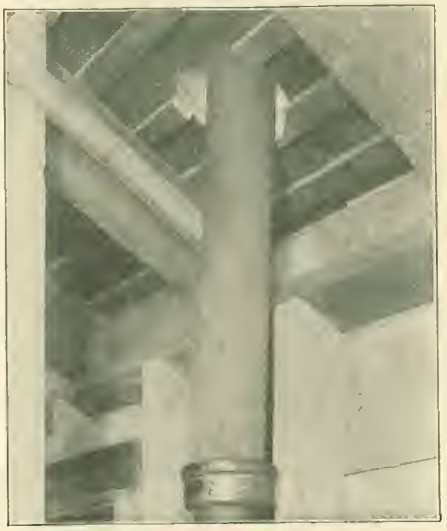


Photo No. 7.

the bathtub. Into the elbow screw a 1½-inch nipple, and screw a 1½-inch galvanized coupling on the end of the nipple, so the tailpiece of the waste from the bathtub can be screwed into this coupling, as shown in Photo No. 12. This photo shows the connections complete, ready to connect the bathtub.

Into the tee in the waste pipe at the lavatory screw a 1½-inch nipple, with a drainage elbow on the end of it, long enough to reach from the tee over into the partition. We are assuming the waste pipe will be concealed in the wall. Into the revent tee near the drum trap you will also screw a nipple with a drainage elbow on the end to run over into the partition.

To install the revent pipe screw a galvanized 1½-inch tee on a piece of 1½-inch galvanized pipe long enough to reach from the 4x1½-inch tee in the soil stack behind the closet tank to directly over the drainage elbow which you have already put in as part of the drain pipe to receive the waste from the lavatory. Into the galvanized tee at the end of your length of pipe you will screw another piece of 1½-inch galvanized pipe with a galvanized elbow on the end of it, this last piece of pipe to be long enough to reach directly over the drainage elbow you have put in as part of the revent pipe near the drum trap for the bathtub. By referring to

Photo No. 6.

Installation No. 1, on page 3, you can more easily follow this description.

Into the side opening of the tee above where the lavatory will stand connect a long screw, as shown in Photo No. 13. This photo shows not only the tee and the long screw, but also pipe coming up from below butted up against the lower end of the long screw, as will be described a little farther on.

Connect another long screw into the elbow in the end of your revent pipe, where it is to lead down to the branch near the drum trap. Then into the drainage elbow at the floor where the lavatory will stand screw a piece of 1½-inch galvanized pipe with a 1½x1¼-inch drainage tee on the end. This piece of pipe must be long enough to reach from the drainage elbow up to where the trap from the lavatory will attach to the wall. Get the exact measurement from the roughing-in measurements on pages 39 and 40. Into the top of this drainage tee screw a piece of 1½-inch galvanized pipe, long enough to reach the end of the long screw you have already put in above, as shown in Photo No. 13. Then connect these two pipes by screwing down the coupling of the long screw onto the pipe coming up (which must of course be threaded), until the coupling is half on the pipe and half on the long screw, as shown in Photo No. 14. Wrap

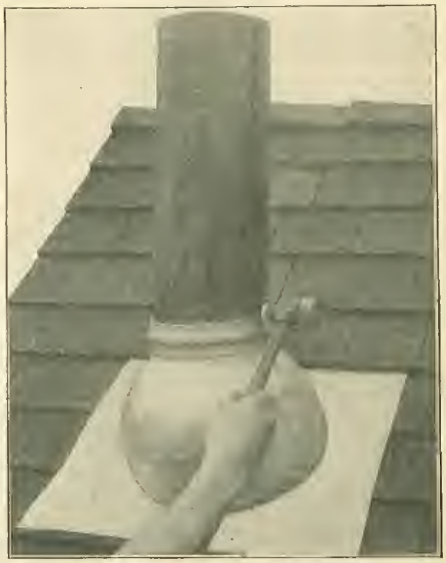


Photo No. 9.

Photo No. 10.

some packing, such as torch wicking or similar cotton wicking, around the threads of the long screw just above the coupling, and screw the locknut down tight. Photo No. 15 shows the union joint completed. This makes a very safe and rigid joint. There is no washer to rot, and settling of the building will have no effect on this connection.

In a similar manner screw into the drainage elbow under the floor near the drum trap a piece of 1½-inch galvanized pipe long enough to reach up to the long screw which you have already screwed into the elbow above. Make the union connection exactly as just described for the lavatory revent. You will then have all the soil pipe, waste pipe and revent pipes laid for the bathroom.

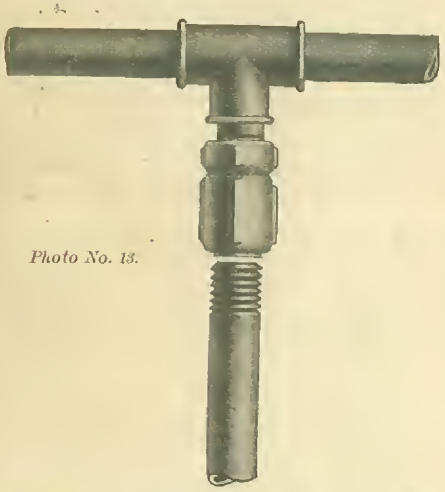


Photo No. 13.

How to Install the 2-Inch Soil Pipe for Sink and Laundry Tub Waste and Revent

The pipe rest to hold the 2-inch soil stack for the sink and laundry tub drainage may rest upon the floor in the basement, as shown in Installation No. 1, or may be rested on the joists, as in Photo No. 2, on page 4, or if the joints are too far apart, it may rest upon 2x4's nailed to the joists, as in Photo No. 3, page 4. Calk a 2x1½-inch soil pipe tee into a piece of 2-inch soil pipe just long enough to reach a foot or two below the floor. (The soil pipe shown in the illustration below the basement floor, is a continuation running to the drain or sewer.) Then drop it through the pipe rest. Brace this piece of pipe so that it will not shift around, and be sure to turn your tee in the proper direction to receive the waste from the laundry tub. Next build up the stack by calking a length of soil pipe into the top of the tee just mentioned. Fasten the pipe so it will not move while calking. The roughing-in measurements on page 39 will tell you exactly how high the sink trap should be above the kitchen floor. You might fasten a tee temporarily at the proper height and then measure from the bottom of this tee down inside the hub of the 2-inch soil pipe you have coming up from the basement. Cut off a piece of soil pipe the required length and calk the sink tee into it. Then calk this piece of pipe with the tee on it into the hub of the pipe coming up from the basement. Be sure the sink tee faces outward toward you.

Calk a 2x1½-inch tapped revent tee into a piece of 2-inch soil pipe long enough to reach from the sink tee up about 3 feet 6 inches above the floor. Calk this pipe with the tee on the end of it into the sink tee and then continue the 2-inch stack up to the roof the same as described previously for the 4-inch stack for the bathroom waste. (See pages 4 and 5.)

Into the revent tapped tee just above the sink screw a 1½-inch street elbow, and into the other end of the street elbow connect a long screw.

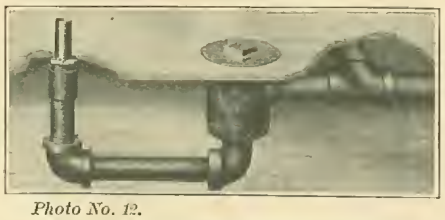


Photo No. 12.

Next make the offset shown under the laundry tub in Installation No. 1. Referring to page 39 you will get the exact height at which to place the tee into which the laundry tub trap will be screwed. Take this height into consideration when making the offset. Into the tee below the laundry tub, in the vertical 2-inch stack you have already put up, screw a 1½-inch nipple with a 45-degree drainage elbow on the end of it, and into the drainage elbow screw another nipple with another 45-degree drainage elbow on the end of it. This makes the offset from the 2-inch stack. Then into the last 45-degree elbow goes another 1½-inch nipple about 2 inches long, with a drainage tee screwed on the end of the nipple, this tee is to receive the drainage from the laundry tub. It must be at the height given for your tub in the roughing-in measurements on page 39. Into the top of this tee screw a piece of 1½-inch galvanized pipe long enough to reach up to the lower end of the long screw you have already put in, up above the sink. Make the connection between the pipe coming up and the long screw as previously described.

Installing the Roughing-In of the Supply Pipes

If the supply pipes are to be concealed in the partitions, they must go in before the fixtures are placed in position, and this, as

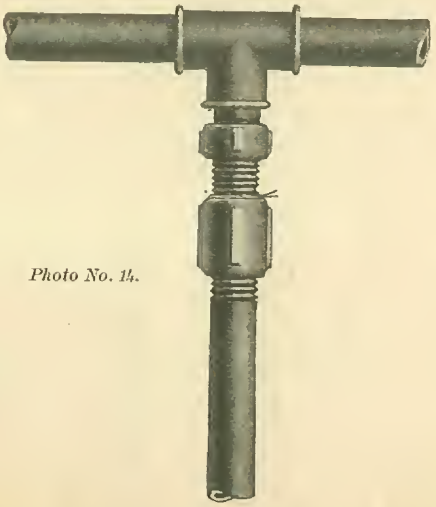


Photo No. 14.

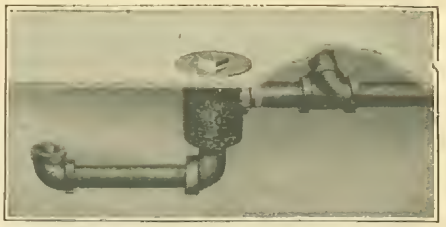


Photo No. 11.

you already know, is called "roughing-in." Where the water supply pipes are not to be concealed, it is not necessary to put them in when other roughing-in is being installed. It is much easier to install the supply pipes when they are left exposed. Where this is desirable the fixtures can be connected to the waste piping and set in position before running the hot and cold water supply pipes to them.

If the fixtures you install have the supply pipes to the floor instead of to the wall (those in Installation No. 1 have the supply pipes to the wall), you will simply run the hot and cold water piping directly under the faucet openings of the bathtub and lavatory and directly under the supply opening of the flush tank, leaving tees turned up straight towards the floor, instead of turning the tees toward the wall

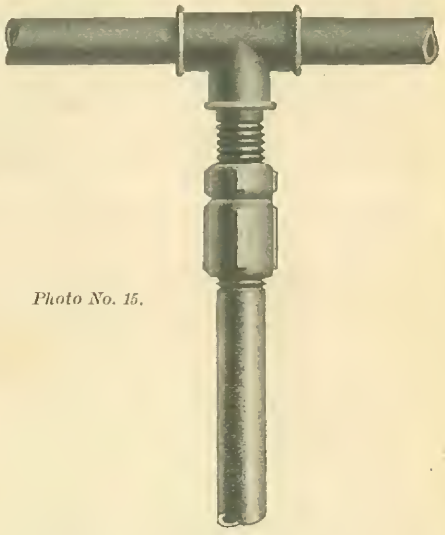


Photo No. 15.

and putting in nipples to run over to the wall, as is necessary when the pipe has to run up inside the partition. The roughing-in measurements on pages 39 and 40 will give you the proper distance from the wall to run your pipes when connecting up through the floor.

Installing Cold Water Supply Pipe

It is not necessary to have your water supply system, whether it be an Ever Ready Water Supply Outfit, city pressure or an attic tank, already installed before you put in the supply pipes, etc., for the cold water supply pipe can be connected to any system by simply using a union and whatever pipe that will be necessary to connect the source of the water with the starting point of your supply pipes running through the building. In fact, it is customary to install the house water supply piping first. We call your attention to this so that you may know that it is unnecessary to wait for the water to be brought to the house before proceeding with your roughing-in.

The following description is based on Installation No. 1, on page 3. In that installation the ¾-inch supply pipe extends just below the basement floor and is not

connected to any particular water supply. We will start, then, from a point just below the basement floor.

First screw a ¾x½-inch tee on the end of a piece of ¾-inch pipe long enough to reach from about a foot below the basement floor to a point on a line about 1½ inches below the faucet openings of the laundry tub. This distance allows for laundry tub tees. The roughing-in measurements on page 39 will give you the height of the faucets on your laundry tub. Fasten the tee to the wall with a tin strap and put another strap down near the floor.

The cold water faucet of any fixture is always on the right as you face it. Therefore, as you are now installing the cold water line, screw a laundry tub tee on the end of a piece of ½-inch pipe long enough to reach from the ¾x½-inch tee in the upright pipe to the first faucet opening of the laundry tub.

The side opening or branch of the laundry tub tee is to be turned up, so that it will come right in the center of the faucet hole. Then screw another laundry tub tee on the end of a piece of ½-inch pipe long enough to reach from the first tee to the first faucet opening in the second compartment of the tub. Get your measurements from page 39. The second tee will also have the side opening turned up. Next screw a ½-inch elbow on a piece of ½-inch pipe long enough to extend from the laundry tee just mentioned to about 2 inches beyond the end of the laundry tub. Into the top of the elbow screw a ½-inch nipple about 4 inches in length with a cap on the end of it. This forms an air chamber to prevent pounding in the pipes when a faucet is turned off. The cold water supply for the laundry tub is now complete.

Now run the cold water pipe up into the kitchen by screwing a ¾-inch tee on a piece of ¾-inch pipe long enough to reach from the tee in the upright pipe near the tub to where illustration for Installation No. 1 shows a tee between the sink and the boiler. This is slightly below the level of the bottom of the sink. Next screw a ¾-inch elbow on a piece of ¾-inch pipe long enough to reach from the tee just mentioned over directly under the center of the faucet opening in the sink. Next screw a ¾-inch tee on a piece of pipe sufficient in length to reach from the elbow just mentioned up to where the faucet for the sink will be placed. (Keep referring to page 39 for the proper heights.) Into the top of the tee screw a ¾-inch nipple 4 inches in length with a cap on the top of it to form an air chamber.

After you have the cold water pipe complete as far as the sink, fasten it firmly with ¾-inch pipe straps, so that after the laths and the plaster are put on the studs there will be no danger of the pipe shifting. As a protection against foreign substances getting into the pipe, screw a ¾-inch nipple with a cap on it into the side opening of the tee temporarily.

Now into the top of the tee between the sink and the boiler screw a piece of ¾-inch pipe sufficient in length to reach up just a little above the top of the boiler. On the end of this pipe screw a ¾x½x¾-inch tee. This tee will be the cold water opening from the supply to the range boiler. After the pipe just mentioned is screwed tight into the fitting and the tee turned out toward where the range boiler will set, fasten this pipe with straps so that it cannot move. After placing a temporary nipple and cap in the side opening of the tee, screw a ½-inch elbow on a piece of ½-inch pipe long enough to reach from the top of the tee to a point between the ceiling of the kitchen and the floor of the bathroom.

If the joists run in the same direction as the pipe will run the pipe can easily be run between two joists. If, on the other hand, the joists run across you will run your pipe from below up to within 1 inch of the top of the bathroom floor joist. Then you can cut a notch 1 inch in depth in all joists that have to be crossed, which will allow the pipe to run across the top of the joists under the bathroom floor.

Next screw into the elbow beneath the bathroom floor a piece of pipe long enough to reach over into the corner of the room, where Installation No. 1 shows another elbow, turning the pipe to connect with the supply pipe of the closet tank. Next screw a ½x⅜-inch tee to a piece of pipe long enough to reach from the elbow just mentioned to a point on a line with the closet tank supply pipe. Into the side opening of this tee is screwed a short piece of ⅜-inch pipe long enough to carry it to directly under where the supply pipe will come down from the tank. This short piece of pipe has previously had a ⅜-inch elbow screwed on it to receive the nickel plated supply pipe from the tank. Get measurements from pages 39 or 40.

Now run the supply pipe from beneath the closet tank over to the lavatory by screwing a ½-inch tee on the end of a

Photo No. 16. **Dropping cold water pipe into boiler**

piece of ½-inch pipe long enough to reach from the tee beneath the closet tank to a point on a line with the center of the cold water faucet of the lavatory. To carry the supply pipe from this tee over into the partition screw a ½-inch elbow onto a short piece of ½-inch pipe just long enough to reach over inside the partition. Into this elbow screw a piece of ½-inch pipe with a ½x⅜-inch tee on the end of it, the pipe to reach from the elbow to the point where the nickel plated supply pipe from the lavatory faucet will attach to the wall. See page 39 for measurement. Into the top of the tee screw a ½-inch nipple 4 inches in length with a cap screwed on top of it to form an air chamber. Now run the cold water supply pipe over to the bathtub by screwing an elbow on a piece of ½-inch pipe long enough to reach from the tee at the floor below the lavatory faucet to a point directly under where the nickel plated supply pipe will come down from the bathtub to the floor.

Any opening like the elbow just mentioned should be brought to a point just flush with the finished bathroom floor, so that they may not become clogged with foreign substances before they are connected to the fixtures. We advise screwing into each of the openings a temporary nipple with a cap on the end of it.

To install the hot water supply pipe first cut a piece of ¾-inch galvanized pipe sufficient in length to reach from a point on a level 1½ inches *above* the faucet holes for the laundry tub up to a point just below the sink. On one end of this pipe screw a ¾x½-inch elbow, and on the other end a ¾-inch tee. Fasten this pipe alongside the upright cold water pipe running from the basement up into the kitchen. Fasten it firmly to the studding with pipe straps, using either nails or screws to fasten. Then screw a laundry tub tee on the end of a piece of ½-inch galvanized pipe long enough to reach from the elbow at the base of your hot water pipe to the second laundry tub faucet, which is the first hot water faucet. The side branch of the laundry tub tee must be turned *downward.* The pipe with the tee on the end is then screwed into the elbow at the lower end of the pipe running upstairs. Assuming that you have a double laundry tub, you will then screw another laundry tub tee on a piece of ½-inch galvanized pipe long enough to reach from the left hand faucet hole in the first tub to the left hand faucet hole in the second tub, which is the last opening in the laundry tub. Screw this piece of pipe into the first laundry tee, leaving the last tee with its side branch turned downward, as with the other hot water tee. Finally screw a ½-inch elbow on a piece of pipe long enough to reach from the last laundry tee about 2 inches beyond the edge of the laundry tub. Screw this pipe and elbow into the last laundry tee. Into the top of the elbow screw a ½-inch nipple about 4 inches in length with a cap on the end of it. This extension is to form an air chamber The hot water supply pipe to the laundry tub is now complete.

From the tee at the top of your upright hot water pipe, which you have running up into the kitchen a little below the level of the sink, run a piece of ¾-inch pipe long enough to come directly beneath the hot water faucet of the sink. You will get the distance between the cold water and hot water faucet holes of your sink from page 39.

On the end of the pipe coming over, you will screw an elbow, and up from this elbow you will run a piece of ¾-inch pipe with a tee on the end of it, the pipe to be just long enough to bring the side opening of the tee to the height of the hot water faucet hole, which, of course, is the same as that of the cold water faucet. Into the top of the tee screw a ¾-inch nipple about 6 inches in length, with a cap on the end of it, to form an air chamber. The hot and cold water supply pipes to the sink are now complete.

Now into the top of the tee branch where the hot water pipe to the sink branches off, screw a piece of ¾-inch pipe long enough to reach just a little above the top of the range boiler, that is, to the height of the hot water coupling at the top of the boiler, and on the end of this pipe screw a ¾x½x¾-inch tee. Into the top of this tee screw a piece of ½-inch galvanized pipe with an elbow on the top of it, sufficient in length to reach up between the ceiling of the kitchen and the floor of the bathroom. If the horizontal pipe from this elbow will run with the joists, the pipe coming up from the boiler will extend up about 6 inches, but if the horizontal pipe will run across the joists, it will be necessary to notch the joists as described on this page with reference to cold water pipe.

Now into the elbow at the top of the hot water pipe screw a piece of ½-inch gal-

vanized pipe sufficient in length to reach over into the corner, running parallel with the cold water pipe you have already put in. There will, of course, be an elbow at the end of this last piece of pipe. From this elbow you will measure over to a point just below the hot water faucet of the lavatory and will screw a tee on a piece of ½-inch pipe long enough to reach from the elbow to this point. In order to reach over into the partition you will screw into the side opening of this tee a piece of pipe with an elbow on it of sufficient length to go over into the partition, and into this elbow you will screw a piece of ½-inch pipe with a ½x⅜-inch tee on it, the pipe to be long enough to bring the side opening of the tee at the proper height to be connected with the nickel plated supply pipe that comes with the lavatory. The height of this tee for your lavatory will be found on page 39. Into the top of the tee screw a nipple about 4 inches in length, with a cap on the top, for an air chamber. Then, into the tee below the lavatory, screw a piece of ½-inch pipe long enough to reach over to where the hot water supply pipe of the bathtub will reach to the floor, and screw an elbow on the end of this pipe. This completes the hot and cold water supplies for the bathroom.

How to Get the Correct Measurements

Let us again call your attention to the fact that on pages 39 and 40 we give all the so-called roughing-in measurements for every fixture we sell. By referring to those pages, under the head of the sink, or tub, or lavatory, or closet you are installing, you will obtain all the measurements, such as the height of traps and faucets and distances from finished walls and floor, which are very necessary to have when installing the pipe before the fixtures have arrived. You will not make any mistakes of measurement if you constantly refer to those pages.

Installing the Range Boiler

First screw the straight coupling into the bottom of the boiler. The cold water coupling that is to go in the top of the boiler is tapped, that is, has threads inside, to take the boiler tube that carries the cold water to the bottom of the boiler so that it may not mix with the hot water. After screwing the boiler tube into the cold water coupling, drop the tube into the boiler, as shown in Photo No. 16, and screw the coupling down into the top of the boiler. Into the other opening, at the top of the

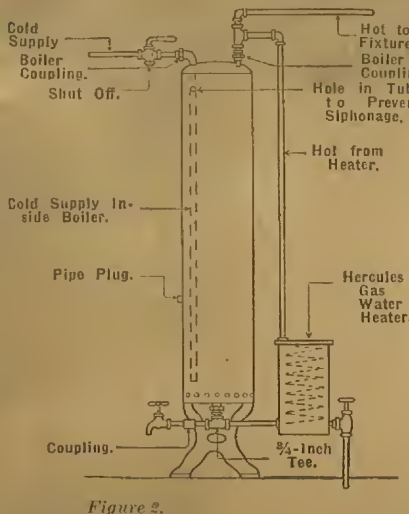


Figure 2.

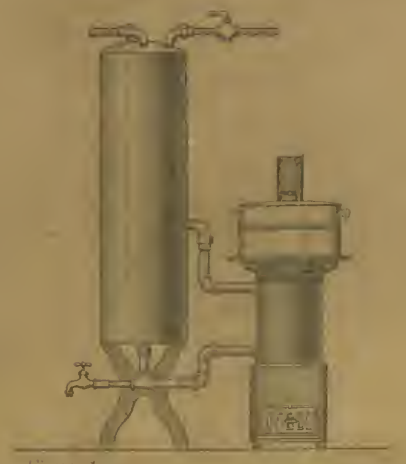


Figure 1.

boiler, screw the remaining coupling for the hot water pipe. For your own information later, mark which coupling is for hot or cold.

Now put the boiler stand together, if it is a collapsible stand, by means of the nut and screw bolt furnished for this purpose. Next set the range boiler on the stand and move it over to where the hot and cold water openings show through the wall. If you have put a temporary nipple in the cold water tee, unscrew it and put in a nipple just long enough to come about an inch outside the finished wall. On this nipple screw a lever handled stop cock. This stop cock is used to shut the cold water off from the boiler, when necessary. Shutting off the cold water of course shuts off the hot water, too, as the cold water is the supply.

Now, into the nearer end of the stop cock screw a nipple sufficiently long to reach from the end of the stop cock to the face of that part of the coupling remaining on the boiler after half the union has been unscrewed from it. This half of the union is then screwed on the nipple, and then a washer put in between the coupling and the union and screwed into the half of the union remaining on the boiler.

The hot water pipe to the boiler is connected by removing the temporary nipple from the hot water tee, if one has been put in, and screwing a piece of pipe into the tee with half the range boiler coupling union screwed on the end, this piece of pipe to be long enough to reach from the tee to the face of that half of the coupling which remains on the boiler. The washer is then placed between the coupling on the boiler and the union on the pipe and screwed into the coupling.

Next, proceed to connect the range stove with the boiler if you are going to heat your water by means of such a stove. First screw into the lower or cold water opening of the range a piece of pipe, long enough to extend over to within 3 inches from the outer edge of the boiler. Screw an elbow on the end of this pipe, and into the elbow another piece of pipe long enough to reach down on a level with the lower edge of the coupling at the bottom of the boiler. Screw another elbow on the end of this pipe, and into this elbow a piece of pipe with a tee on the end of it, the pipe to be long enough to bring the side opening of the tee directly under the boiler coupling at the base of the boiler. Then screw into the side opening of the tee a short nipple and connect the boiler coupling to this nipple by means of the union on the coupling.

Then into the end opening of the tee screw a piece of pipe long enough to reach out beyond the edge of the boiler. On this screw an ordinary pipe coupling, and into the pipe coupling screw an ordinary faucet. This is to draw off the water when necessary.

Now, into the upper opening of the water front of the range, screw a piece of pipe long enough to reach from the range stove to a point directly under the side coupling of the range boiler. There will be a ¾-inch elbow on the end of this pipe. Then screw half, or the union part of the side coupling of the boiler on a piece of ¾-inch pipe sufficient in length to reach from the elbow before mentioned up to the face of the side coupling which remains screwed in. Place the washer between the two halves of the union and screw it up tight. You now have the range boiler connected both to your pipe lines and to the stove.

Installation No. 1, on page 3, shows the boiler connected to a stove as described, and Figure 1 shows the same kind of connection for a coal tank heater. If your boiler is to be connected with a gas or oil water heater, Figure 2 shows the proper con-

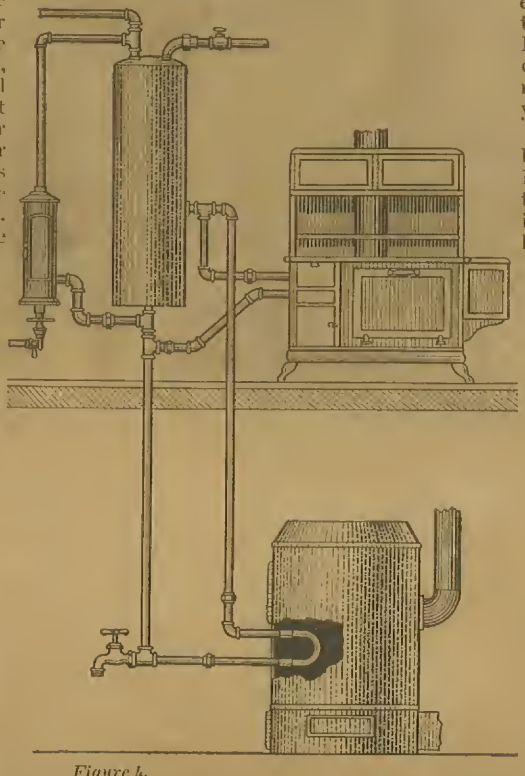


Figure 4.

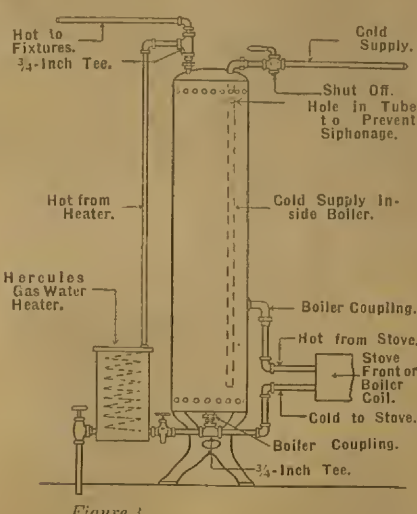


Figure 3.

Photo No. 18. **Closet bend lying flush**

nections for this. Figure 3 shows the proper connections if the boiler is connected with both a heater and a range stove. Figure 4 shows the proper pipe connections when the boiler is connected with range stove, heater and furnace, so that any fire that is most convenient and comfortable may be used to heat the water.

Installing the Sink

With the complete sink will come iron wall hangers, into which the projections or lugs on the back of the sink top fit. These are concealed by the top when the sink is in place.

These hangers should be fastened to the wall very securely, since they must bear the whole weight of the sink. To do this, cut a board the width of the hollow in the back of the hangers and a little shorter than the inside of the back of the sink. Hold the sink up against the wall so that the faucet holes come exactly opposite the tees of the supply pipes you have already put in. If you have not yet put in the supply pipes, get the proper height from page 39. Then mark on the wall where the top of the sink comes, and also the center points of the two projections on the sink back which are to fit into the hangers. Then nail or screw the board tightly to the wall in such a position that the hangers when placed over the board will have the centers of their tops on the marks showing the center of the sink catches. Be sure to nail or screw the board into the studding and not simply into the laths. Then place the hangers over the board in the proper position to take the sink catches and screw the hangers firmly to the board, as shown in Photo No. 17.

Now unscrew the sink strainer from its coupling and drop the strainer through the hole in the bottom of the sink. Slip the rubber washer over the screw or nipple end of the strainer, which will extend down through the sink. Then screw the coupling up tight against the washer.

After fastening the strainer in this way, hang the sink by hooking the lugs at the back into the sockets of the hangers you have attached to the wall. Then screw the trap into the waste pipe tee you have already placed in the wall, and connect the other end of the trap to the nipple or tail-piece that comes through the sink by means of the union nut on the inlet end of the trap. The waste connection of the sink is now complete.

Next take two ¾-inch nipples long enough to extend about ¾ of an inch outside the sink back when screwed into the supply pipe tees that are already in the wall opposite the faucet openings of the sink. The faucets screw on these nipples. Screw them up tight until the flange of the faucet rests snugly against the sink back. The sink installation is now complete.

Photo No. 17. **Sink hangers in position**

Installing the Water Closet

Our description again assumes that the roughing-in of the waste pipe and supply pipe has already been done and that it is now merely necessary to connect the closet with these pipes. Installation No. 1, on page 3, gives an idea of the completed job.

We assume that the closet bend is already installed and flush with the floor. The collar of the closet bend should lie flat on the floor, as in Photo No. 18. If your supply pipe has been properly placed the elbow looking upward will have its center about 3 inches from the finished wall. We shall also assume in this first description that you have a cast iron closet bend. If you are using a lead closet bend, follow the directions for using lead closet bend found on page 10.

With a cast iron closet bend, first place putty around the rim of the bend, allowing the putty to extend about ¼ of an inch over the edge into the closet bend, so that when the closet bowl is set on top of the bend, as shown in Photo No. 19, it will squeeze into the opening and in that way make a tight joint. If a graphite washer is used, which many local plumbing laws require, you will simply place the washer on top of the closet bend. The washer will extend partly over the bend, and the brass bolts that are furnished with the collar of the bend will come up through the eyelets or screw holes in the bowl. You will place the metal washer over the tops of these bolts and screw the bowl tight to the floor by means of the nuts furnished for this purpose.

Next screw the 2-inch nickel plated flush elbow in the top of the closet bowl by first slipping the union nuts, one over each end of the elbow, and then a washer over either end. You are now ready to set up the closet tank.

Photo No. 19. **Bowl ready for tank**

Photo No. 20. **Hanging closet tank**

The easiest way to hold the tank while putting it up is to sit down on the bowl facing the wall, and place the tank on your knees and rest it flat against the wall. You will then have your hands free to feel underneath and shift the tank (by moving your knees), until the flush pipe from the bowl can be slipped into the coupling in the bottom of the tank. Then mark through the tank hangers where the screws are to be put in the wall. While you have the tank in position and the pipe connecting it to the bowl the proper length, screw up the coupling on the bowl end of the pipe tight enough to keep the pipe from shifting when you lift the tank off.

Now put two strong screws in the wall where you have marked into the studding, if possible, as the tank will be fairly heavy when filled with water. Screw the nickel plated supply pipe for the tank into the ⅜-inch elbow of the water supply pipe showing through the floor, cutting the pipe long enough to reach to the water supply

Photo No. 21. **Beating lead bend flat**

Photo No. 22. **Putting legs on tub**

spud coming through the tank. Then hang the tank on the screws in the wall, as shown in Photo No. 20, slipping the coupling over the pipe from the bowl as you let it down. Next tighten up the couplings on the connections to the bowl and to the water supply pipe, attach the cover to the bowl and the installation is complete.

If Lead Closet Bend Is Used

Practically the same method as described on page 9 is followed when a lead closet bend is used instead of an iron bend. The lead bend is flanged on the floor with a hammer, as shown in Photo No. 21. Before the closet bowl is set, putty is placed on the floor on top of this bend and allowed to hang over on the inside about a quarter of an inch. Set the bowl on top of this putty and screw it tight to the floor. The rest of the installation is exactly as described on page 9.

Installing the Lavatory

The following directions apply to a pedestal lavatory with nickel plated supplies to the wall, as shown in Installation No. 1, on page 3. Description of the installation of a lavatory without pedestal will be found on page 14, and the slight difference in installation when the supplies are to the floor is described on page 16.

The first thing to do before setting a lavatory like the one shown in Installation No. 1 is to screw the nickel plated supply pipes to the supply openings in the wall. We assume that the supply piping has already been roughed-in, as previously described. Next screw the lavatory trap into the waste opening. Now put the two faucets into the faucet openings on top of the lavatory and screw locknuts on the ends of the faucets, which will hold the faucets in a rigid position at the proper height over the bowl. Now push the lavatory toward the wall the required distance. The supply pipes are then simply connected to the faucets by means of the union nuts. As the lavatory we are now speaking of has a model waste and overflow, the trap is connected to the tailpiece of this waste and overflow by means of a union nut on the tailpiece of the trap.

Photo No. 23. **Tub ready for connection**

Installing the Bathtub

Installation No. 1, on page 3, illustrates a bathtub installation similar to the one we are about to describe.

When installing the bathtub first attach the waste strainer which goes on the bottom of the tub. Turn the tub upside down, being careful to rest it on something that will not damage the enamel. Put the threaded end of the strainer through the hole in the bottom of the tub, slip over it outside the tub the rubber washer and screw on the curved pipe which leads to connecting tee between the waste and overflow.

If the tub has legs, put them on the tub as shown in Photo No. 22. The legs slip over the projections cast on the bottom of the tub and are held fast by wedging the hook on the leg and the projection on the tub with a square iron nail. We include the necessary nails with the tub.

Next turn the tub right side up, put the faucets through the faucet holes and fasten them by the locknuts. Fasten the overflow pipe in the hole under the faucets as follows: Unscrew the ring that holds the plug chain, hold the upright overflow pipe with the rubber washer between it and the tub on the outside and screw on the overflow strainer against the inside. Then slip the nickel plated tee over the end of the overflow pipe with the drain pipe from the bottom of the tub in the side opening and tighten the couplings enough to hold it until you finally set the tub in position, as in Photo No. 23.

Next screw the nickel plated offset supply pipes into the elbows on the ends of the hot and cold water supply pipes in the floor, and put the floor plates down over the nickel plated supply pipes and over the coupling which you have screwed into the waste pipe leading to the drum trap under the floor. Photo No. 23 shows the tub connections completed as far as we have now gone.

Next lift the tub up and set the end of the nickel plated tee over the drain pipe extending up from the floor. Tighten up the three coupling nuts to the overflow pipe, the strainer pipe and the pipe in the floor. Then attach the supply pipes to the faucets with the union nuts, and the tub is complete.

Installing the Laundry Tub

Our description is for the tub in Installation No. 1, on page 3. The principles of this installation are correct for any laundry tub.

The first thing to do is to screw the tub trap into the drainage tee that we assume has already been installed to take care of the tub drainage. The legs of the tub are then braced, as shown in Photo No. 24, so that they will not topple over when the tub is placed upon them. The legs of the tub should not be at the extreme ends, but each leg should be about 4 inches from the end of the tub. If there is a wood floor, the legs can be screwed to the floor, but this is not absolutely necessary, as the trap and supply pipes, together with the legs, will hold the tub in a rigid position.

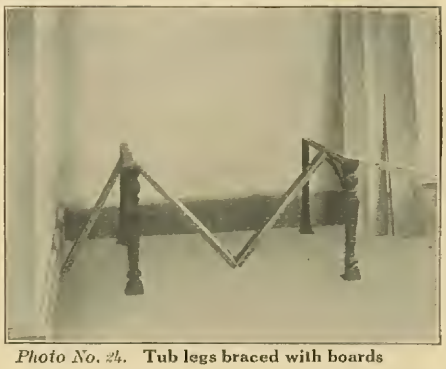


Photo No. 24. **Tub legs braced with boards**

Next attach the faucets to the tubs. It is easiest to do this with the tub standing on end. When handling, be careful not to strike the projection on the bottom to which the trap is to be bolted. This can easily be broken off by careless handling.

The holes for the faucets are not drilled all the way through when the tub is shipped, because some customers prefer to run the hot and cold water pipes above the top of the tub, making the faucet holes unnecessary. If you wish the faucets to come through the back of the tub the uncut part of the faucet holes is very easily removed with a cold chisel and hammer, as shown in Photo No. 25. When making the openings, be careful to use a narrow chisel and to strike it lightly. Otherwise, you may crack the granite facing around the holes.

Now place the tub upon its legs carefully, being sure not to strike the waste projection on the bottom, and slip the waste projection into the top of the tub trap. The top rim of the trap should be lined with putty to make it watertight. Bolt the trap to the tub by the short bolts that come with it. Put the heads of the bolts into the slots on either side of the connections and screw up the nuts against the trap. The two extra nuts are used to lock the first, so that there will be no possible chance for them to loosen.

If you use compression (stub) laundry tub faucets, you can screw them direct into the laundry tub tees that are already in the wall; but if you use the other kind of laundry tub faucet, with the thread on the inside, it will be necessary for you first to screw nipples into the laundry tub tees in the wall, nipples that are long enough to extend about ¾ of an inch forward of the back of the laundry tub. The faucets are then screwed on these nipples with the flanges tight against the back of the tub.

Photo No. 25. **Opening the faucet holes**

Supply Pipe Connections When Attic Tank Is Used

Installation No. 2 on this page shows the proper pipe connections when the water pressure is supplied by an attic tank, the water being taken from a well or cistern, or even from a spring or stream, and pumped into the tank by means of a force pump or a ram. As you know, it is necessary to have some sort of pressure to have running water available at any time. In this case, the height of the tank supplies the necessary pressure.

Assuming that your attic tank is already set, the first thing to do is to put a ¾-inch pipe connection in the bottom of the tank. Then put a 1-inch pipe connection in one end of the tank down about 3 inches from the top. This 1-inch connection is for the overflow.

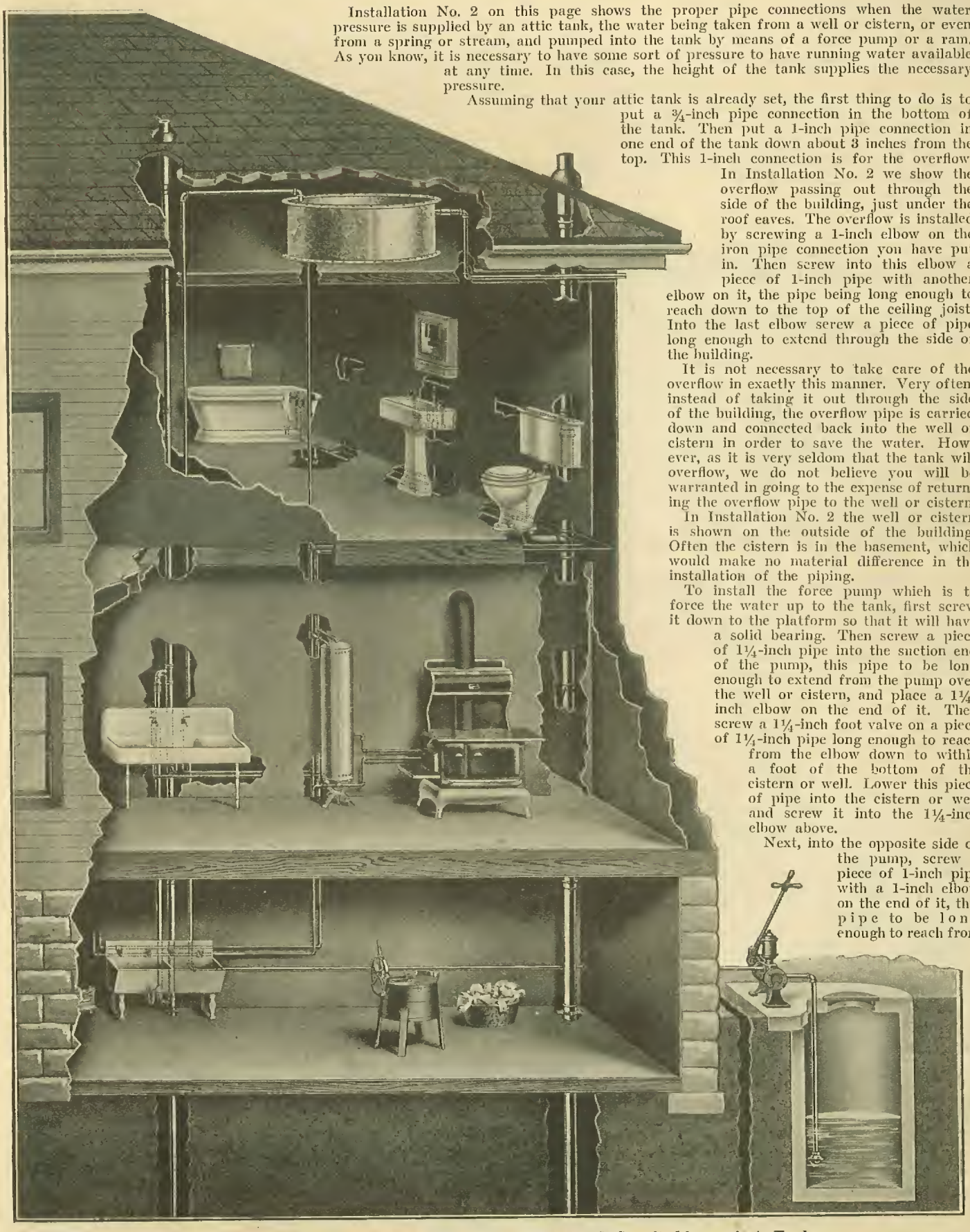
In Installation No. 2 we show the overflow passing out through the side of the building, just under the roof eaves. The overflow is installed by screwing a 1-inch elbow on the iron pipe connection you have put in. Then screw into this elbow a piece of 1-inch pipe with another elbow on it, the pipe being long enough to reach down to the top of the ceiling joist. Into the last elbow screw a piece of pipe long enough to extend through the side of the building.

It is not necessary to take care of the overflow in exactly this manner. Very often, instead of taking it out through the side of the building, the overflow pipe is carried down and connected back into the well or cistern in order to save the water. However, as it is very seldom that the tank will overflow, we do not believe you will be warranted in going to the expense of returning the overflow pipe to the well or cistern.

In Installation No. 2 the well or cistern is shown on the outside of the building. Often the cistern is in the basement, which would make no material difference in the installation of the piping.

To install the force pump which is to force the water up to the tank, first screw it down to the platform so that it will have a solid bearing. Then screw a piece of 1¼-inch pipe into the suction end of the pump, this pipe to be long enough to extend from the pump over the well or cistern, and place a 1¼-inch elbow on the end of it. Then screw a 1¼-inch foot valve on a piece of 1¼-inch pipe long enough to reach from the elbow down to within a foot of the bottom of the cistern or well. Lower this piece of pipe into the cistern or well and screw it into the 1¼-inch elbow above.

Next, into the opposite side of the pump, screw a piece of 1-inch pipe with a 1-inch elbow on the end of it, this pipe to be long enough to reach from

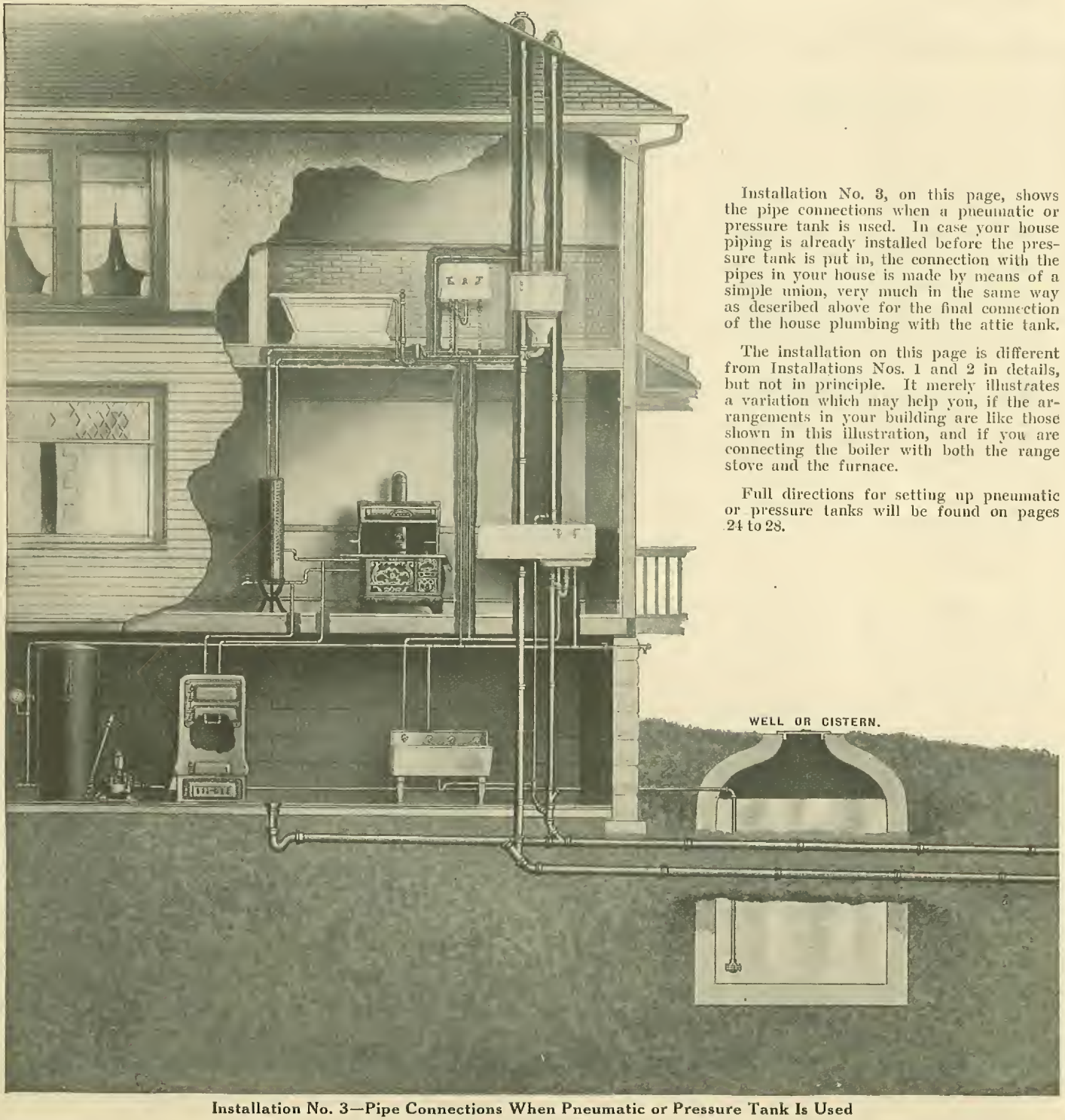


Installation 2—Pipe Connections When Water Pressure Is Supplied by an Attic Tank

the pump over to where you will begin to run the pipe up to the tank, and then continue the pipe up through the house to within 4 or 5 inches of the end of the tank and about 2 inches above the top of it, as shown in the illustration. Very likely, you will not be able to run the pipe as straight as shown. You can easily make turns and offsets by means of elbows. At the very top of the vertical pipe you will screw an elbow, and into this elbow a piece of pipe nipple with another elbow on the end of it. Into the last elbow you will screw a 10-inch nipple. This carries the supply over the top of the tank and down into it.

Next screw a union onto the pipe connection at the bottom of the attic tank and measure a piece of ¾-inch pipe long enough to reach down to a tee under the bathroom floor, connecting with the cold water pipes of your house plumbing, allowing for the pipe to enter ¾ of an inch into the tee and ¾ of an inch into the union just below the tank. Then into the end of this pipe screw half of the ¾-inch union and screw the other end of the pipe into the tee under the bathroom floor. Finally place a washer between the half of the union that is on the attic tank and the half that is on the end of the pipe coming up from the bathroom, and screw the two halves together. In this way you will have made connection between the water supply and the fixtures in your house.

Supply Pipe Connection When Pneumatic or Pressure Tank Is Used

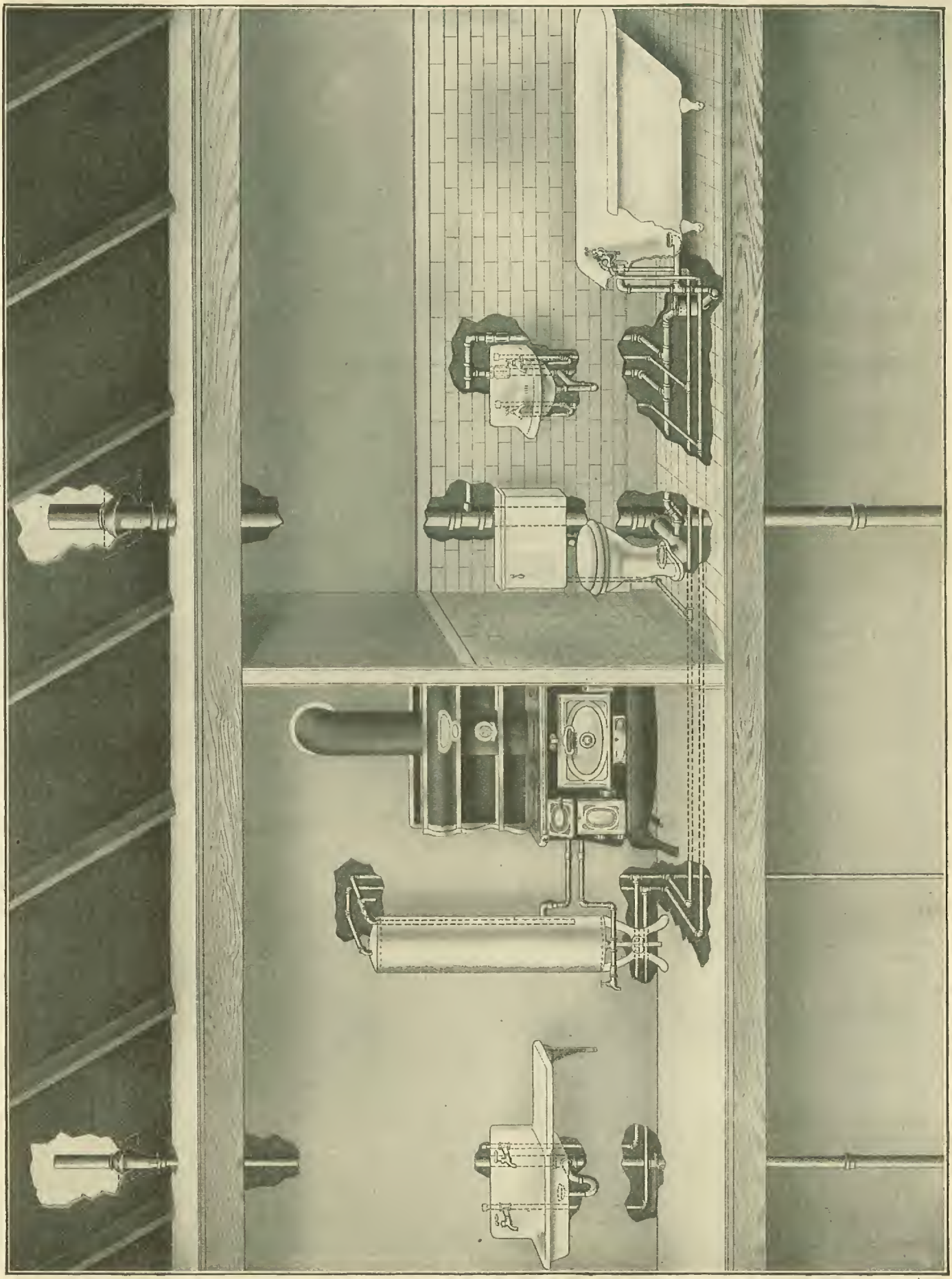


Installation No. 3, on this page, shows the pipe connections when a pneumatic or pressure tank is used. In case your house piping is already installed before the pressure tank is put in, the connection with the pipes in your house is made by means of a simple union, very much in the same way as described above for the final connection of the house plumbing with the attic tank.

The installation on this page is different from Installations Nos. 1 and 2 in details, but not in principle. It merely illustrates a variation which may help you, if the arrangements in your building are like those shown in this illustration, and if you are connecting the boiler with both the range stove and the furnace.

Full directions for setting up pneumatic or pressure tanks will be found on pages 24 to 28.

Installation No. 3—Pipe Connections When Pneumatic or Pressure Tank Is Used



Installation No. 4—Pipe Connections (Revented) When Kitchen and Bathroom Are on the Same Floor

INSTALLATION No. 4
Consisting of Bathroom and Kitchen on the Same Floor

Installation No. 4, as illustrated on page 13, shows an arrangement quite usual with one-story houses, or wherever the kitchen and bathroom must be on the same floor. The sink is connected to a 2-inch soil pipe stack, with the boiler to furnish hot water. The bathroom outfit is connected to 4-inch soil pipe. The traps of the lavatory and bathtub are revented in this installation. These fixtures are also shown arranged along one wall, which is not only a saving, but is also the most practical arrangement. Among other things it gives larger floor space in the bathroom.

The fixtures in the bathroom consist of a 5-foot porcelain enameled iron bathtub, a half circle lavatory and a low tank closet. These fixtures are revented in practically the same manner as was described for Installation No. 1, the revent pipe consisting of a 1½-inch galvanized pipe connected into the 4-inch stack at least 3 feet above the highest fixture. See description for Installation No. 1 beginning on page 4 for directions for installing the waste and revent pipe.

In the kitchen are shown a one-piece porcelain enameled iron sink with a reversible drain board and a range boiler, both of which are installed in the same manner as was described for Installation No. 1 beginning on page 4.

In fact, the entire installation, when the arrangement is similar to that shown here is carried out in practically the same manner as was described for Installation No. 1, even if you have different fixtures and different arrangements. The roughing-in measurements for all our fixtures will be found on pages 39 and 40. You will naturally run the pipes according to conditions. It may be necessary in order to avoid obstructions in your house, to use elbows, nipples, etc., in places where we do not show them in our installation, but this should present no great difficulty. As you know, full directions for cutting and threading wrought iron pipe and cutting and calking soil pipe will be found in the back of this book.

There is, however, one difference in this installation, and that is, a style of lavatory different from the lavatory shown in our Installation No. 1. The lavatory in Installation No. 4 is a style that is hung from the wall, while the one in Installation No. 1 is a pedestal lavatory.

How to Install a Lavatory That Hangs From the Wall

We will assume that the supply pipes have already been roughed-in very much as described on pages 4 to 8. Follow the directions for the roughing-in as given on these pages, if you have not already done this work. The following, then, is a description of how to install the lavatory:

The first thing to do is to fasten the hanger to the wall. It is fastened in very much the same manner as described for fastening the sink hanger on page 8, except that the lavatory hanger is in one casting, while the sink hanger consists of two or more brackets.

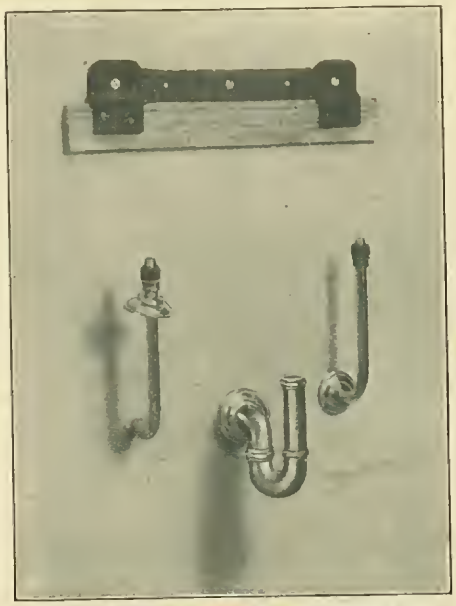


Photo No. 26. **Basin hanger, trap and supply pipes**

It might be well to mention here again that it is advisable in all instances where pipe is to run concealed in the walls to put in so-called "Grounds" to carry the screws for the sink, lavatory and closet tank, before the wall is lathed, plastered or covered in any way. By a ground we mean a board about 12 inches in width and long enough to extend about ½ inch beyond each end of the hanger. The ground is to be nailed in between the joists, so that when the sink, lavatory or closet tank is screwed to the wall, the screws will have a solid hold. Of course, it is not absolutely necessary to have grounds, as usually you will be able to strike one or two studdings when fastening to the wall.

The supply pipe which you have already laid according to the roughing-in measurements, will help you in determining the proper height for the lavatory, and hence the proper height at which to place the hanger.

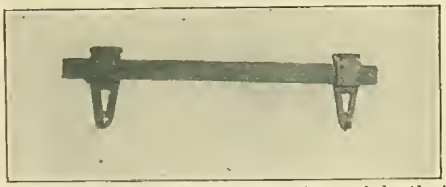
Photo No. 26 shows the lavatory supplies and hanger properly installed. Reference to this photograph will help you to hang the hanger and properly to install the hot and cold water supply pipes and the trap.

Now put in the faucets or basin cocks, as they are known. This is done by first removing the couplings and locknuts from the cocks and dropping the cocks down through the holes in the top of the lavatory and tightening the locknuts. Then put in the basin plug by screwing out the little strainer and plug cup of the tailpiece of the lavatory trap. You will then put the washer on the flat part of the tailpiece that goes up against the bottom part of the lavatory. Next screw the plug cup into this tailpiece. In order to do this, it is necessary to have some one hold the waste plug tight by sticking a screwdriver or something similar down between the prongs. Then take a wrench and screw the tailpiece up to the bottom.

Next hang the lavatory on the hanger by means of the lugs at the back which fit into the grooves of the hanger. Be careful that the supplies you have already installed go directly up to the basin cocks and that the tailpiece on the basin plug slips into the trap. All that will then be necessary to complete the installation is to screw up the union nuts on the basin cocks and the union nut on the top of the trap to the tailpiece of the lavatory.

The installation of the sink, boiler, water closet and bathtub is the same as for Installation No. 1, described on pages 8, 9 and 10.

Installation of Sink Hangers



With each complete one-piece sink that has a back there are iron wall hangers into which the projections or lugs on the back of the sink top fit, and which are concealed by the top when the sink is in place.

These hangers should be fastened to the wall very securely, since they must bear the whole weight of the sink.

To do this, cut a board the width of the hollow in the back of the hangers and a little shorter than the inside of the back of the sink. Hold the sink up against the wall at the height you desire and mark on the wall where the top of the sink comes and also the center points of the two projections on the sink back which fit into the hangers. Also mark on the wall where the two faucet holes come. Then nail or screw the board tightly to the wall, so that the hangers will hold the sink at the desired height, being sure to nail into the studding and not simply into the laths. Over the board place the hangers with the centers of their tops on the marks showing the center of the sink catches and screw the hangers firmly to the board.

Arrangement of Supplies for a Two-Part Laundry Tub

Diagram No. 1 is the outline of the supply pipes to a laundry tub. This arrangement shows the hot and cold water openings for a two-part laundry tub. You will note that the laundry tub tees in the hot water pipe are turned down so that this pipe is not trapped while the cold water supply comes from below and the laundry tub tees are turned up. By using these specially constructed laundry tub tees it is possible to keep all openings in the laundry tub parallel or on a line without using any cross over fittings.

The two short pieces of cap pipe shown on the ends of the hot and cold water supplies are air chambers, their object being to prevent a rattling in the pipe when the water is suddenly shut off at the faucets.

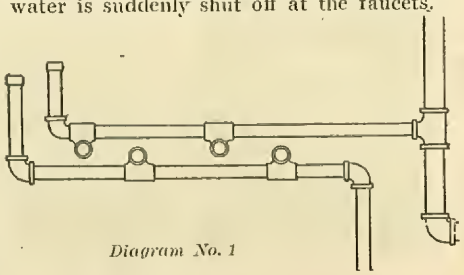
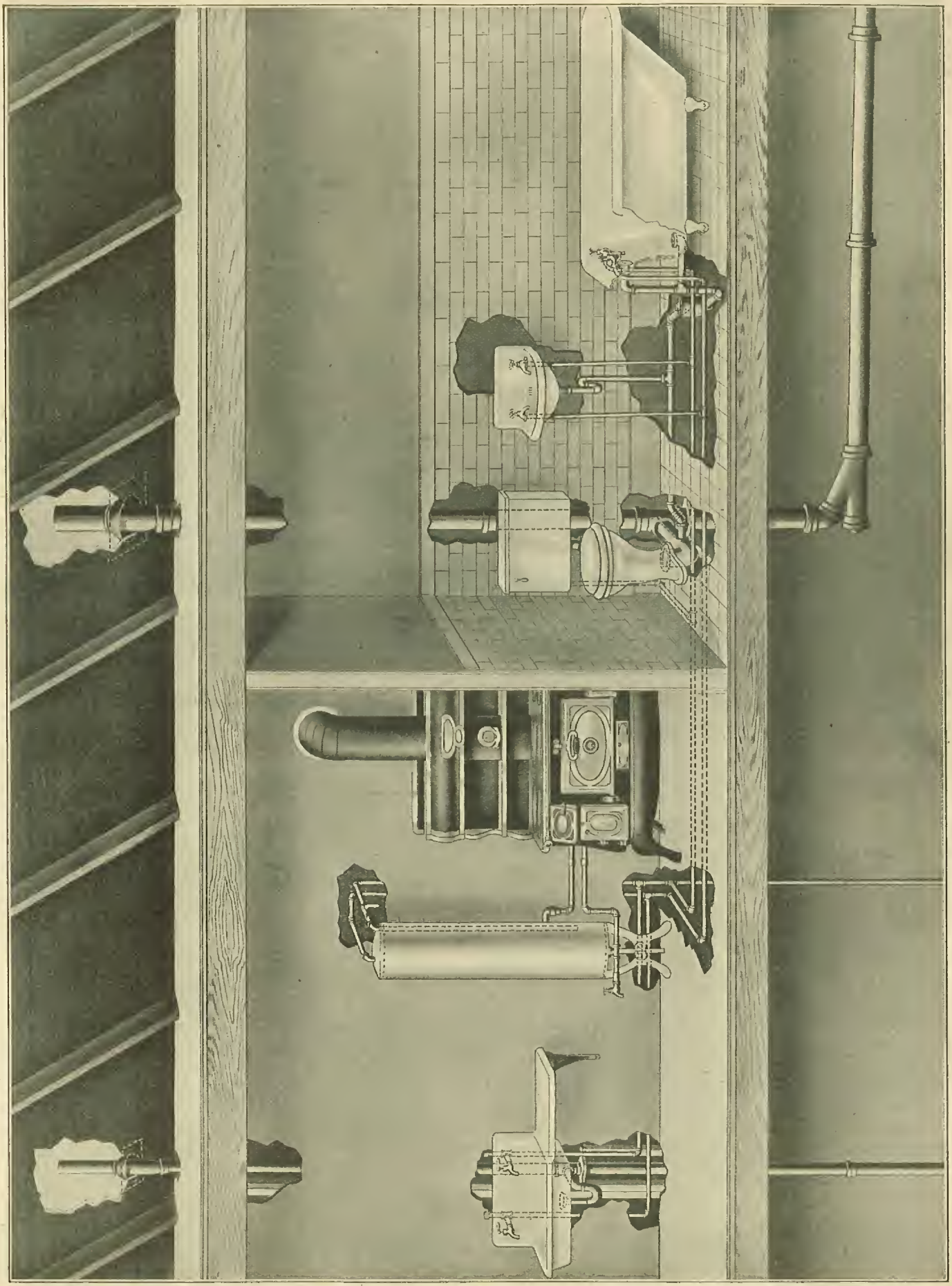


Diagram No. 1



Installation No. 5—Pipe Connections When Kitchen and Bathroom Are on the Same Floor With Fixtures Not Revented

INSTALLATION No. 5

Consisting of Kitchen and Bathroom on the Same Floor With Fixtures Not Revented

Installation No. 5, illustrated on page 15, shows exactly the same arrangement of fixtures as Installation No. 4 on page 13. The only differences are that the bathtub and lavatory traps are not revented, and that, in this installation, we show the lavatory, waste and supply pipes to the floor instead of to the wall. Furthermore, we show in this installation a continuation of the 4-inch soil pipe out through the basement.

As the sink in this installation and also in Installation No. 4 is the only fixture on the line of the 2-inch stack, and as this makes a slight difference in the installation of the stack, we might profitably describe the start of the stack here.

Installing 2-Inch Soil Stack for Sink

First cut a hole in the floor back of and below the sink on a line where the sink trap will enter the wall. Then from the roughing-in measurements on page 39 of this book get the exact height that the trap opening of the sink is from the floor. Next calk a 2x1½-inch tee into the hub of a full length of 2-inch soil pipe. This pipe with the tee on the end can then easily be held up to the height of the sink trap opening and a mark placed on the studding for the desired height for the pipe rest that is to hold the soil pipe. Now the rest can be placed between the studding by nailing cleats on the side of the studding. Be careful to fasten it securely. After it is placed, you can then drop the soil pipe with the 2x1½-inch tee on the end down through the rest. Then continue the 2-inch stack up to the roof from the top of the tee.

Installing the 4-Inch Soil Pipe

First calk a clean-out plug into the running end of a Y and then an eighth bend into the side opening of the Y. Then stand a length of 4-inch soil pipe up on its end and calk the outlet end of the Y into this. You can then lay the length of soil pipe with the Y and eighth bend turned up towards the stack. Be sure that the soil pipe has a solid bearing of either brick, concrete or hard clay—any solid bearing except wood. Also pitch it towards the point of discharge at a grade of at least ¼ of an inch to the foot. Photo No. 27 shows the Y, eighth bend and soil pipe leading to the discharge and also the start of the stack calked into the eighth bend.

Photo No. 28. **Closet bend in tee**

You now proceed to extend the 4-inch soil pipe to the outside of the building, which involves making horizontal calk joints. These are made differently from vertical joints, as a joint runner must be used to hold the lead in, as you pour it into the joint. Full directions how to make a horizontal calk joint will be found on page 37. Simply calk length after length of pipe together until you reach the drain into which the sewage is to enter.

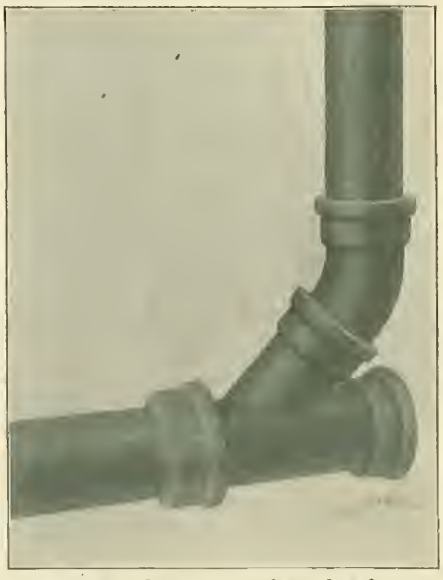


Photo No. 27. **Connections at base of stack**

Next you can build up the vertical soil stack to the bathroom and then to the roof. This is done in very much the same manner as was described on pages 4 and 5, to which we refer you. You can avoid making a horizontal calk joint between the closet bend and the soil pipe tee at the bathroom floor by calking the closet bend into the tee before calking the tee into the pipe coming up from below. Be sure that you have your closet bend the proper length, as called for by the roughing-in measurements of your closet, before calking it into the tee. Photo No. 28 shows the closet bend calked into the tee.

Of course, in the soil stack in this installation there will be no tapped tee above the closet, because there will be no revent pipe from the lavatory and bathtub to go into the stack.

Installing Waste Pipe for Lavatory and Bathtub

The first thing to bear in mind is that the waste pipe runs at a higher level than the side opening of the closet bend into which it empties. The pipe should be run at such a level that the top of the drum trap for the bathtub will be flush with the finished floor. In order to bring the pipe up to this level, first screw a 1½-inch 45-degree elbow on a piece of 1½-inch pipe about 1 foot in length, and into this elbow screw a close 1½-inch nipple with another 45-degree elbow on the end of it. This combination of two elbows and two short pieces of pipe when screwed into the closet bend makes the offset required to bring the waste pipe up to the proper level to permit the drum trap of the bathtub to rest flush with the floor.

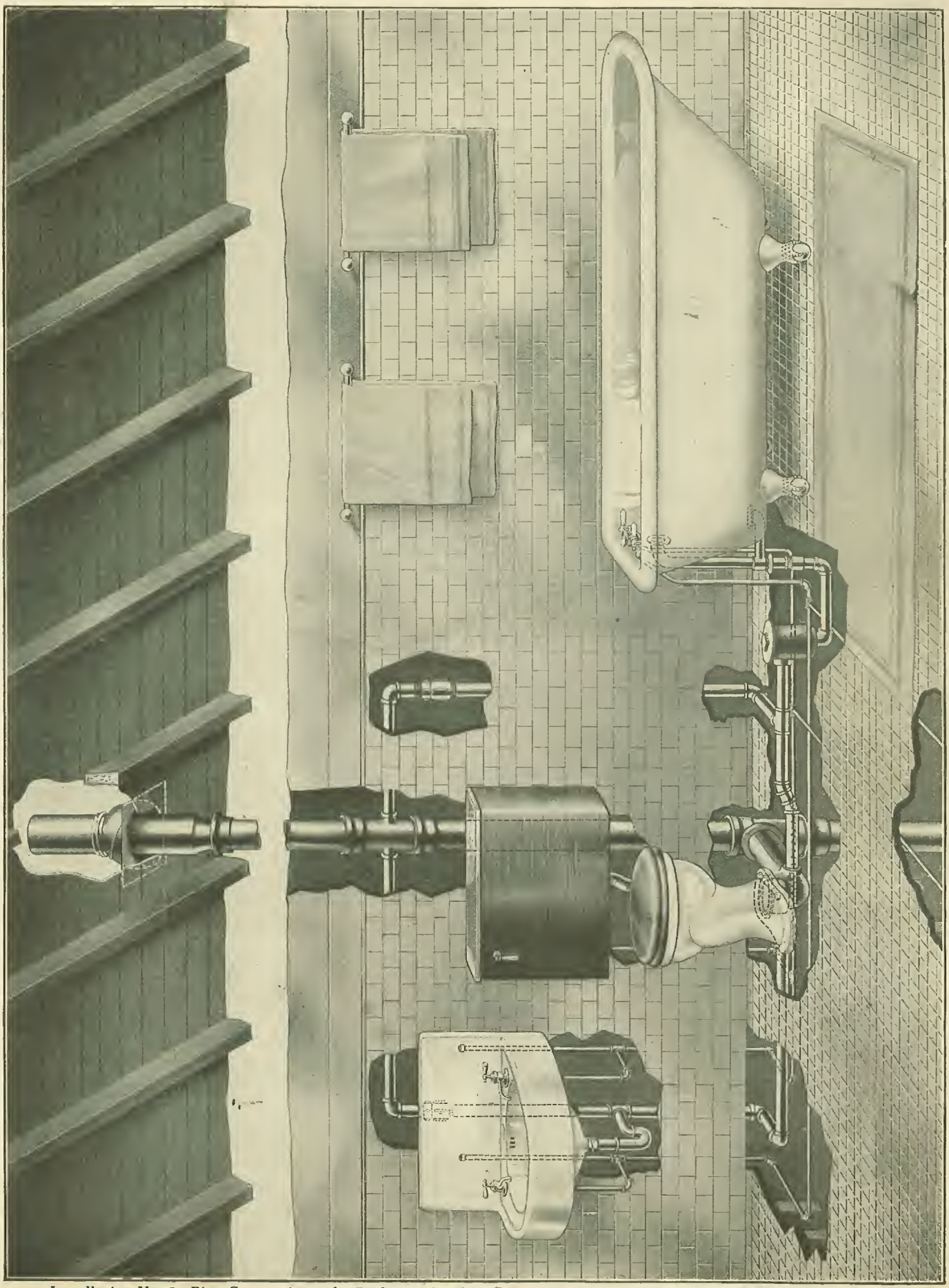
Next screw a 1½x1¼-inch drainage tee on a piece of 1½-inch galvanized pipe long enough to reach from the last 45-degree elbow to a point directly under where the trap for the lavatory will come down to the floor. The exact position of this tee is determined by the position of the lavatory and by the roughing-in measurements on page 39, which give the distance of center of waste from the wall. The reason you put in a reducing tee here is that the lavatory trap here is 1¼-inch and threaded for 1¼-inch pipe.

You will next locate the proper position of the drum trap for your bathtub, which, as you will notice, is connected with the bathtub drain by two elbows and a nipple between. In our illustration we show a bend in the drain pipe from the lavatory to the drum trap, but it may be possible for you to run this pipe straight. The pipe coming from the lavatory is screwed in the side opening of the drum trap. Then into the bottom of the drum trap screw a 1½-inch drainage street elbow. Next screw a 1½-inch drainage elbow on a piece of pipe long enough to reach from the street elbow to directly below the drain pipe from the bathtub, and when this last piece of pipe with the elbow on the end is screwed into the street elbow in the bottom of the drum trap, you have finished the roughing-in of the waste pipe for both bathtub and lavatory.

Supply Pipes to Fixtures

It will hardly be necessary to go into the details of the installation of the supply pipes in this installation, except to call attention to the fact that we illustrate the lavatory with the supply pipes to the floor. Therefore, the supply pipes leading to the bathtub and lavatory can run under the floor with tees turned up towards the floor in the proper positions, so that the supply pipes from the fixtures can be screwed direct into these tees. In other words, it will not be necessary to run the supply pipes over in the partition, as was the case with Installation No. 1 where the lavatory supply pipes were to the wall. With this exception, the directions for roughing-in the supply pipes as given on pages 6, 7 and 8 can be followed.

Photo No. 29. **Drain connections screwed in**



Installation No. 6—Pipe Connections of a Bathroom With Lavatory and Bathtub on Opposite Sides of the Soil Stack

INSTALLATION No. 6
Consisting of a Bathroom With Lavatory and Bathtub on Opposite Sides of the Soil Stack

Installation No. 6 illustrated on page 17, shows a water closet connected into a 4-inch soil stack in the same manner as has been previously described. Since, however, the bathtub and the lavatory are on opposite sides of the stack, the waste and revent pipes must be arranged somewhat differently from the installations previously described. You will notice that both the bathtub and the lavatory are revented, and the revent pipes run into the soil stack a little above the closet tank. The waste from the bathtub runs into one side of the closet bend, while the waste from the lavatory is screwed into the opposite side of the closet bend.

Some plumbing ordinances require the waste from the fixtures to run direct into the soil stack instead of into the closet bend. Your installation can be made to conform with these laws by plugging the tapped openings in the closet bend, and instead of using an ordinary 4-inch tee in the stack where the closet connects, using a tee with a 1½-inch tapping on each side, one to receive the waste from the bathtub and the other the waste from the lavatory.

We simply mention this fact so that you will understand it is not absolutely necessary to install your fixtures exactly as shown in this installation.

Installing the Soil Pipe

The soil pipe stack is begun and carried up to the closet in the same way as described for Installation No. 1 on page 4. If the floor is already laid in your bathroom, you can cut out a pocket, that is, a board between two joists, say about 15 inches from the wall, or take up two or three boards, so that after you have calked the soil pipe tee into the closet bend, you can drop it through this space. The floor can then be easily replaced and snugly fitted around the closet bend.

After getting as far as the tee into which the closet bend is calked, you will calk a length of soil pipe into the top of this tee, and into the top of this length of soil pipe calk a 4x1½-inch tapped cross, as shown in the illustration on page 17. This cross will take the revent pipes. From the top of this cross you will continue the soil pipe in the regular way through the roof.

Installing Waste Pipe for Lavatory and Bathtub

In laying the waste pipe for the bathtub you will again make an offset from the closet bend up to the proper height for the drum trap of the bathtub by means of two 45-degree elbows, and two short pieces of pipe, as described on page 16; and into the second 45-degree elbow will be screwed a piece of 1½-inch pipe with a tee on the end of it in the position shown in our illustration between the water closet and the drum trap of the bathtub. From this tee you will run a 1½-inch galvanized pipe over to the drum trap, making any bends that are necessary, and the rest of the pipe from the drum trap to the bathtub waste in exactly the same manner as described on page 16.

From the tee previously mentioned between closet and drum trap you will get over into the partition by means of a nipple, and this nipple will have an elbow on the end to take the pipe that goes up inside the wall.

Into the side towards the bathtub of the tapped cross in the soil pipe is screwed a piece of 1½-inch pipe with an elbow on the end, the pipe to be long enough to bring the elbow on a line with the elbow in the waste pipe below. Into this elbow is screwed a long screw, and then you bring pipe from the elbow below up to this long screw, and make the connection in the same manner as described on pages 5 and 6.

For the lavatory screw a 1½-inch elbow on a piece of 1½-inch pipe, long enough to reach from the tapped cross in the soil pipe just over to where the waste from the lavatory will enter the wall. A long screw is screwed into this elbow. The waste pipe for the lavatory is then brought over from the closet bend and continued up to the long screw in the pipe above in the same manner as described for Installation No. 1 on pages 5 and 6, remembering that a 1½x1¼-inch drainage tee is put in the upright pipe at the height of the lavatory trap.

The Supply Pipes

The supply pipes are installed practically in the same manner as for Installation No. 1, using ¾-inch pipe for range boiler and sink and reducing it to ½-inch pipe for bathroom fixtures, leaving ⅜-inch openings for the lavatory and closet.

Installing the Fixtures

The bathtub, lavatory and closet are assembled and installed in exactly the same manner as described in Installation No. 1 on pages 9 and 10.

Electric Water Supply Outfits

If electric power is available and the source of water you desire to use in your building is not more than 22 feet below the level where you can place the pump, an electric water supply system will automatically furnish running water at the turn of a faucet and at a very low cost. These systems work automatically, maintaining a pressure of 20 to 35 pounds and require but very little attention. They are also recommended for use in cities where the city pressure is not strong enough to force the water into the upper floors of the building, or, where it is necessary to use rain water for working, an electric pumping outfit connected to the water supply will force the water up to the floors that the city pressure cannot reach, as the electric outfit has sufficient pressure to reach a faucet placed from 50 to 100 feet above the ground.

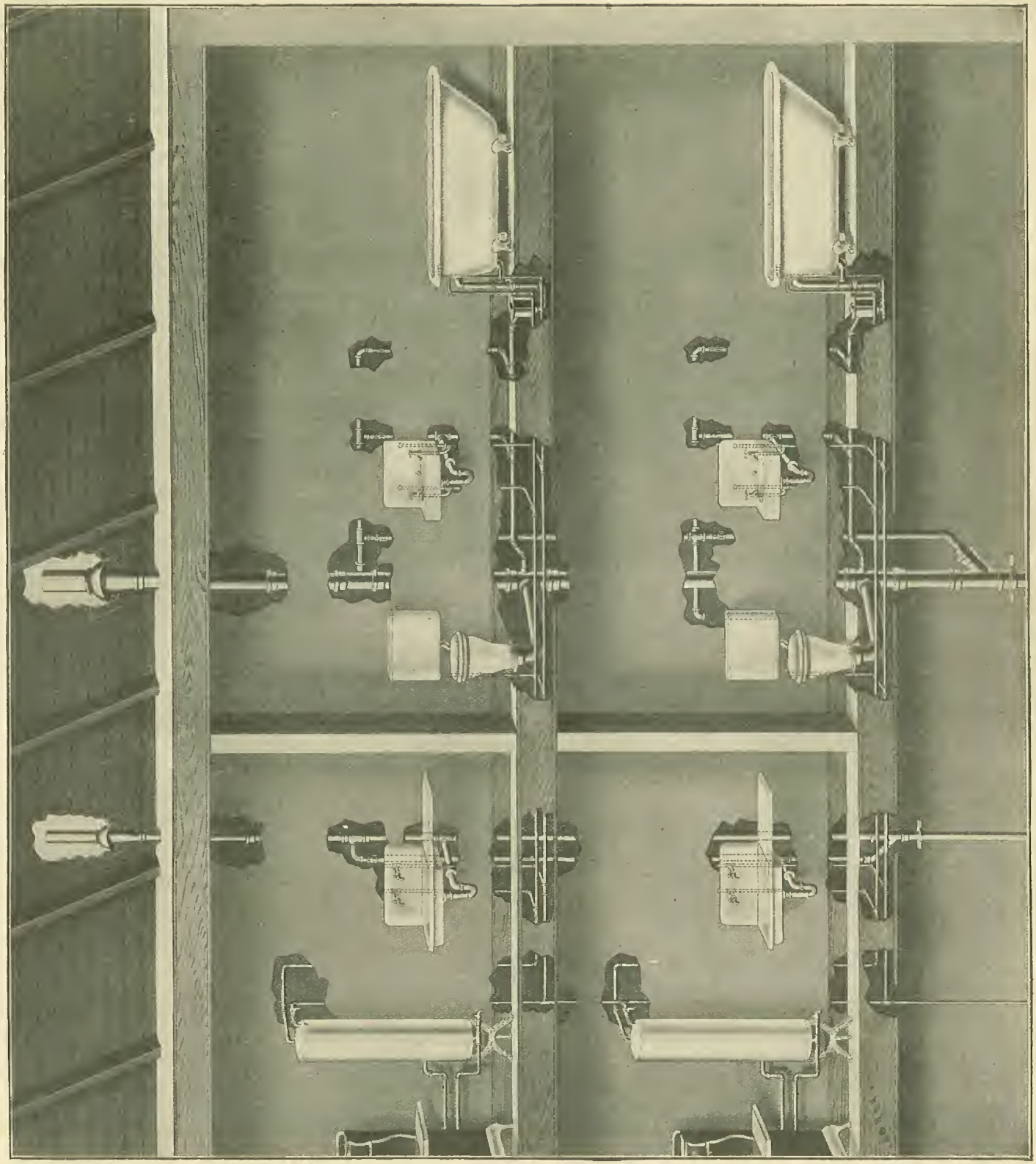
This also means a reliable fire protection, for such a pressure will easily throw a stream of water to the height of the average dwelling.

The charge for water by most cities who have waterworks, is from 20 to 40 cents a thousand gallons. An electric water system pumping water from a cistern, well or other source and delivering water to the plumbing fixtures in the building, with a pressure of from 25 to 30 pounds, will consume from 7 to 12 cents' worth of electricity for every one thousand gallons of water delivered; figuring the electric current at 10 cents a kilowatt hour.

The illustration shows an Electric Water Supply Outfit complete.

These outfits are furnished with tanks having various capacities according to the amount of water required. The pump has a capacity of 125 gallons per hour and is fitted with an automatic switch, which stops the pump when a pressure of 35 pounds is reached, and starts it again when the pressure falls to 20 pounds. For complete information regarding our Ever Ready Electric Water Supply Outfits, see our Modern Plumbing Catalog or our big General Catalog.

INSTALLATION No. 7



Installation of Kitchen and Bathroom Fixtures in a Two-Flat Building, the Fixtures Being Revented in the "Loop" or "Circuit" System

Installation of Kitchen and Bathroom Fixtures in a Two-Flat Building, the Fixtures Being Completely Revented

Installation No. 7, illustrated on page 19, shows kitchen and bathroom on the first and second floors revented in such a manner that no fixture will be affected by the flushing or emptying of other fixtures, regardless of the amount of water that travels down the stack. The system of reventing here shown is known as the "loop" or "circuit" revent system. The revent connects into the stack at a point about 5 feet above the highest fixture, and is returned back into the stack about 3 feet below the lowest fixture, making a complete circuit.

This method of installation will conform with nearly all plumbing ordinances, and will be found highly satisfactory in every way.

Installing the 4-Inch Soil Pipe.

Follow the illustration on page 19 and the following description will be very clear, we believe. Start the 4-inch stack of soil pipe that is to take the drainage from the bathroom by first calking a 4x2-inch Y into a length of soil pipe or into a piece of soil pipe at least long enough to reach down to the sewer connection. Then place a pipe rest at the proper height, so that when you drop the Y and the pipe you have calked into it through the rest, it will leave the lower end of the pipe the proper height to connect with the pipe that will run outside the house. You now have a foundation on which to build the upright stack.

You will note that instead of running the waste from the bathroom and lavatory into the closet bend, as shown in previous installations illustrated and described in this book, we show this waste running into the tee in the soil stack, which is tapped for 1½-inch pipe.

Now to build the soil stack up to the first floor, first get the exact measurement of the piece of soil pipe required to lead from the top of the Y you previously put in, up to the lower end of the tee that will be placed just below the first floor. This tee will be tapped for 1½-inch pipe, as previously mentioned. To get the measurement, it is advisable to hold the tee at the height required to receive the closet bend, and then measure from the bottom of the tee down inside the hub of the Y where the pipe will rest. Cut the pipe to this measurement with a hammer and cold chisel, as described on page 37. Then calk the tee into the hub of this pipe. Next calk the closet bend into this tee, getting its correct length from the roughing-in measurements of your closet, as given in the back of this book. Be sure you have the closet bend setting in the tee, so that it will set perfectly straight and level when the tee is put in position, that is, so the flange will rest flat on the floor, as shown in Photo No. 18 on page 9. Now drop the pipe, with the tee and closet bend calked into it, down into the top of the Y, being sure to brace the tee and closet bend so the pipe will not get out of plumb, and calk it into the Y. You will then build the stack up to the second floor by the same method. Keep the stack braced, so that the closet bend will project on a level.

Into the top of the tee taking the closet bend at the second floor, calk a length of soil pipe, and into the top of this length, calk a 4x2-inch tapped vent tee. From the top of this tee, build the stack up to the roof, and place on top of it an increaser and a roof flashing, as described for previous installations.

Installing the Roughing-In of the Lavatory and Bathtub Waste Pipes

Into the 4x2-inch tapped tee in the soil stack above the closet tank on the second floor, screw a 2-inch nipple, 4 inches in length, and on this nipple screw a 2x1½x2-inch galvanized tee. Then into the 2-inch side opening of this tee screw a 2-inch long screw. Then measure and cut a piece of 2-inch pipe with a 2x2x1½-inch cross screw on the end of it, long enough to reach from the long screw down about 3 feet 6 inches above the finished floor of the bathroom on the first floor.

Next, into the bottom of the cross, screw a piece of 2-inch galvanized pipe with a 45-degree drainage elbow on the end of it, long enough to reach from the cross down to within a few inches of the Y that is shown below the first floor in the illustration on page 19. Into the drainage elbow is screwed a 2-inch nipple with a 2-inch coupling on the end of it, the coupling and nipple being long enough to reach from the elbow inside the side opening of the Y. You will then calk the coupling into the hub of the Y. The reason we have suggested a coupling on the end of the 2-inch pipe is to fill up the Y hub sufficiently to enable you to make a good calk joint.

The waste pipe for the lavatory and tub on the second floor is then roughed-in in exactly the same manner as was described for Installation No. 1 on pages 5 and 6, the end of the upper revent pipe above and to the left of the lavatory screwing into the 2x1½x2-inch galvanized tee you have already put in, instead of into a tee in the soil stack.

The waste and revent pipes are then put in for the first floor in almost exactly the same manner as was described for Installation No. 1 on pages 4, 5 and 6, except that the end of the revent pipe above and to the left of the lavatory is screwed into the cross which you have already put into the upright revent pipe.

If your plumbing law requires a reventing of the closet on the first floor, you will screw a piece of 2-inch galvanized pipe with a 2-inch elbow on the end of it into the open end of the cross. This should be long enough to reach directly over whatever special fitting is required by law to revent the closet, and into the elbow, you will then screw a pipe to connect with this fitting. The reason we do not show this revent connected up, and have only left a dotted line showing it to the left of the soil stack on the first floor is that there are several different methods of making this connection. For instance, some ordinances do not allow reventing from the closet bend. Follow your ordinance on this head, if there is an ordinance in your city. When you have completed this connection, if it is necessary, you will have completed the waste pipe roughing-in for the two bathrooms.

Installing the 2-Inch Soil Pipe for the Two Kitchen Sinks

The two sinks of the two-apartment building illustrated in Installation No. 7 are vented and revented. In order to install the 2-inch soil stack, first arrange for a solid support for the pipe rest that is to support the stack. A 2-inch Y is then calked into a 2-inch piece of soil pipe of whatever length is required to drop through the pipe rest and connect with the pipe that will run to the sewer connection. The Y and the piece of pipe into which it is calked are then dropped through the pipe rest. Into the top of the Y, you will then calk a length of soil pipe, and continue the soil stack up to the 2x1½-inch tee that receives the drainage from the sink on the second floor. Of course, the way to do this is merely to build the stack up to within a few feet of where this tee will be placed. Then hold the tee the proper height to receive the sink trap, as given in the roughing-in measurements of the sink, and measure from the bottom end of the tee into the bottom of the hub of the soil pipe coming up from the first floor. This will give you the exact length of the piece of pipe required between the tee and the hub next below it. After the tee is in place, calk a length of 2-inch soil pipe into the top of it, and in the top of this length calk another 2x1½-inch tee, which will serve as the revent tee. It is not absolutely necessary to use an entire length of pipe between the sink tee and the revent tee. If you happen to have a piece of pipe three or more feet in length, you can use this instead of an entire length. If you have no short pieces of pipe, it will, of course, save work to have an entire length between the two tees. The stack is continued above the upper tee through the roof, and as previously described for Installation No. 1. This completes the 2-inch soil pipe from the ground to the roof.

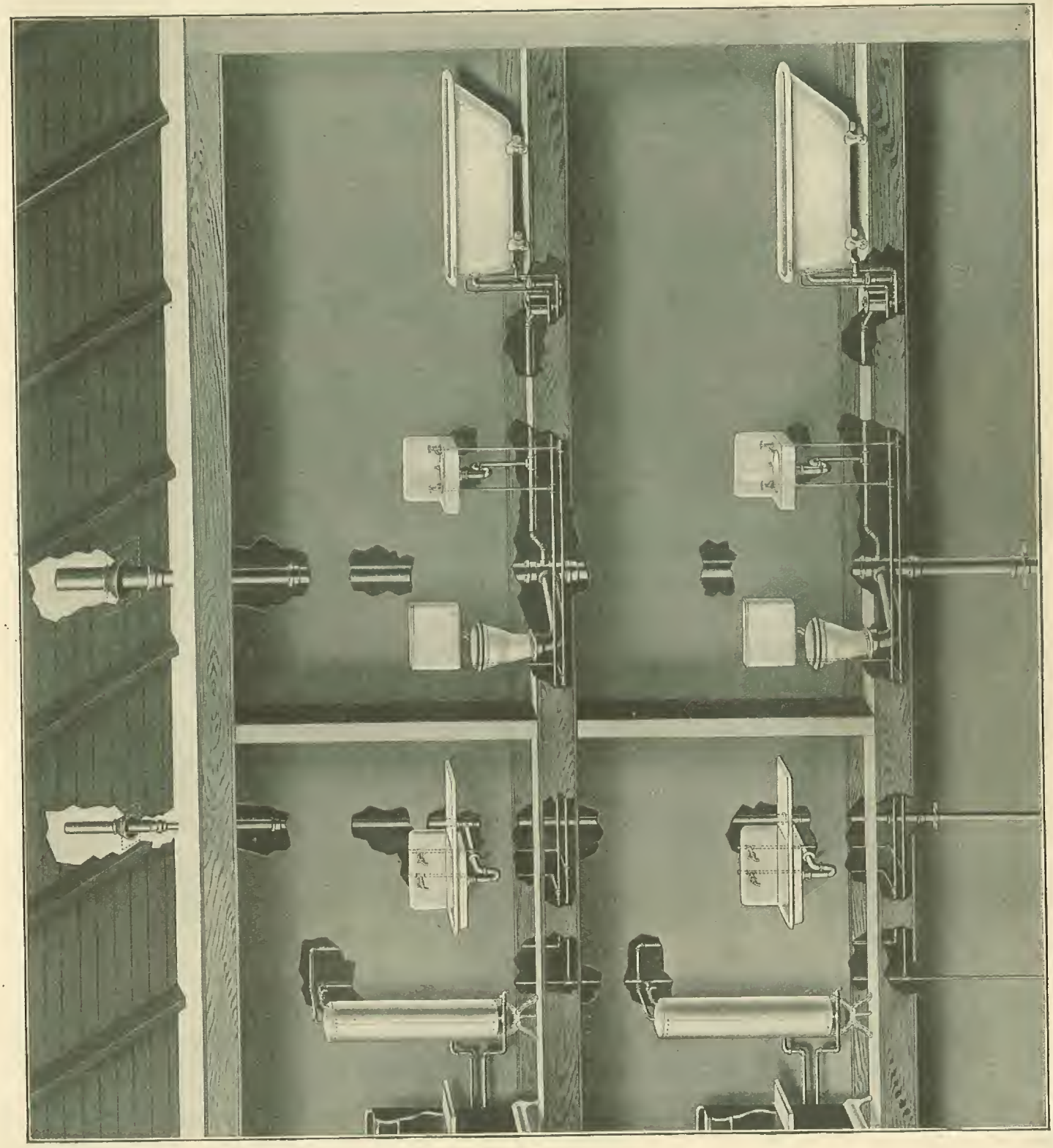
You will now go back to the Y below the first floor and calk into it a 2-inch eighth bend—of course, into the side opening. Next measure the exact height of the sink trap above the first floor, which height will be given in the roughing-in measurements of the sink in the back of this book, and mark this height on the wall. Then calk into the eighth bend below a piece of 1½-inch galvanized pipe with a galvanized coupling on the calked end of it and a drainage tee on the other end, the pipe to be long enough so that the side opening of the drainage tee will be the exact height of the sink trap opening. The reason we suggest a coupling on the lower end of this pipe, is to make a better calk joint into the eighth bend.

Then on the second floor, screw a 1½-inch elbow with a 1½-inch nipple, 3 inches long, into the revent tee in the soil pipe above the second floor sink. Next, into this elbow, screw a long screw. Finally, measure a piece of 1½-inch galvanized pipe, long enough to reach from the drainage tee of the sink on the first floor up to the lower end of the long screw just mentioned. Connect this pipe in by means of the long screw, and you will have completed the waste and revent piping for the two sinks.

Installing of Supply Pipes in Installation No. 8

The installation of the roughing-in of the supply pipes in this installation is so similar to that described for Installation No. 1 on pages 6 to 8 that we shall not describe it again here. The slight differences that come up will be taken up in our description of the installation of the supplies in Installation No. 8 on the following pages, to which you are referred.

INSTALLATION No. 8



Pipe Connections for Kitchen and Bathroom on Each Floor of a Two-Flat Building, Fixtures Not Revented

INSTALLATION No. 8
Showing Kitchen and Bathroom on Each Floor of a Two-Flat Building, Fixtures Not Revented

The installation illustrated on page 21 shows exactly the same fixtures as were shown in Installation No. 7, except that the waste and supply pipes are not revented, and the waste and supply pipes of the lavatory are to the floor instead of to the wall. This method of installation, while fairly satisfactory and much used where there is no plumbing law or ordinance to conform to, will not pass any plumbing ordinance that we know of.

Waste Pipe for Bathrooms

Roughing-in of the waste for the bathroom differs from roughing-in for Installation No. 7 only in the absence of revent pipes, and we believe is so plain in our illustration that it will be unnecessary to go into details with this installation. At any rate it follows closely Installation No. 5, described on page 16, and the description of that installation will do for this.

Waste Pipe for Kitchens

Although the sinks are not revented, they are vented because the stack runs from the ground through the roof. The illustration shows the stack installed with the pipe rest in the basement. We believe, however, the following method will be found more practical. First mark on the wall the height of the waste opening of the sink on the first floor, as given in the roughing-in measurements in the back of the book. This will give you the position of the side opening of the first tee in the stack. Then calk a 2x1½-inch tee into a length of soil pipe. Hold the tee with the pipe in it, so that the tee opening is at the center of the mark you have made on the wall and slip the pipe rest over your pipe to the hub of the tee and mark where the bottom of the rest will come. Now lay the pipe aside and fasten the pipe rest permanently at the height you have indicated.

Then drop the soil pipe with the tee calked in it through the rest, and fasten it so that it will not shift when you are working on the remainder of the stack. You will then proceed to carry the stack upward by calking a length into it, and perhaps another length if this does not carry you above the height of the tee which must be put in for the waste of the sink on the second floor. Hold the tee for the second floor sink at the proper height, as called for by the roughing-in measurements, and measure from the bottom of this tee down into the bottom of the hub of the 2-inch pipe coming up from the first floor. This gives you the exact length of pipe necessary to set the tee. Cut this piece of pipe, and calk the tee into it. Then drop it down and calk it into the pipe coming up from below. Build the stack from the upper tee up through the roof, as described before for Installation No. 1 on page 6.

We have not said anything about the pipe in the ground that is to carry the waste out of the house. This subject of sewage will be taken up on pages 31 to 33.

Installing Supply Pipes for Two-Flat Building

In our description of Installation No. 1 we thoroughly covered the standard method of installing supply pipes, but as the installation of supply pipe in a two-flat building naturally differs slightly, we shall describe it fully here.

Where there are individual flats, it is of course usual to have a range boiler in each of them, and the most convenient arrangement for both flats is to have a separate ¾-inch supply pipe leading up from the basement to each flat, which makes them entirely independent of each other. Our illustrations of Installations No. 7 and No. 8 both show an arrangement which is economical of pipe, and, therefore, much used. In this arrangement there is but one supply pipe leading up from the basement, and water for both flats is supplied by this one pipe.

To start the water supply pipe for the two flats, screw a ¾-inch galvanized tee on the end of a piece of ¾-inch pipe long enough to hang down below the basement joists about 3 feet, when the tee is in a position immediately below the basement floor. After the tee is screwed up on the pipe, strap the pipe firmly to the joist or some such support before you install the remainder of the pipe. Tin pipe straps are generally used for this purpose.

Into the side opening of the tee screw a piece of pipe with a ¾x½x¾-inch tee on the end of it, the pipe being long enough to place this last tee immediately below the cold water supply faucet of the sink on the first floor. Then into the ½-inch opening at the end of this tee screw a piece of pipe long enough to reach over to where the cold water supply will run up to the flush tank of the closet. A ½x⅜-inch tee is screwed on the end of this pipe, since the pipe to the flush tank is a ⅜-inch pipe. From this tee continue over underneath the lavatory, where a ½-inch tee is placed immediately below the cold water supply of the lavatory. Continue from this tee over directly under where the cold water pipe for the bathtub comes down, and here place an elbow.

Then into the tee immediately below the sink screw a piece of ¾-inch pipe with an elbow on the end, the pipe to be long enough to reach over inside the partition. Next, into the elbow screw a piece of ¾-inch pipe long enough so that when a tee is screwed on the end the side opening of it will be at the center of the faucet opening of the sink. Into the top of this tee screw a nipple about 4 inches long, with a cap on it, to form an air chamber for the sink.

Into the tee for the closet tank supply can be screwed the ⅜-inch nickel plated supply pipe for the closet tank, or, as shown in our illustration, it may be necessary to use a nipple and an elbow under the floor to bring the supply pipe over close enough to the wall or out from the wall to get immediately beneath the nickel plated closet tank pipe.

Next into the tee beneath the lavatory is screwed the nickel plated supply pipe from the lavatory. Complete the installation of the bathtub as was described in Installation No. 1.

Into the first tee you have put in, that is, the one at the top of the pipe leading up from the basement, you will now screw in a piece of ¾-inch pipe long enough to reach up to a line with the cold water coupling at the top of the first floor range boiler, and a tee will be screwed here. From this tee you will continue up to immediately below the second floor, where another tee will be placed. From the side opening of this last tee extend pipe to below the right hand faucet of the sink on the second floor, where a ¾x½x¾-inch tee will be placed. Then you continue over to below the flush tank of the closet, with ½-inch pipe, and here another tee is placed. Next you run ½-inch pipe from this tee to beneath the right hand faucet of the lavatory, and from this tee you go over to where the cold water supply pipe from the bathtub will come down, and here place an elbow at the end of the pipe.

Then going back to the kitchen on the second floor, you will run pipe up from the tee beneath the floor to the top of the range boiler, where an elbow is put in, in order to run over to the cold water coupling of the range boiler.

Into the tee beneath the sink screw a piece of ¾-inch pipe with an elbow, the pipe to be long enough to reach over inside the partition. From this elbow run a ¾-inch pipe up to the height of the sink faucet, as taken from the roughing-in measurements of the sink at the back of this book, and here put in a tee. Into the top of this tee is screwed a nipple about 4 inches long with a cap at the top for an air chamber.

Next the ⅜-inch supply pipe that comes with the flush tank of the closet is connected with the tee you have placed beneath it (using a nipple and an elbow if necessary to bring the supply immediately beneath the nickel plated closet tank pipe) and the cold water supply pipe of the lavatory is screwed into the tee beneath the lavatory. Complete the installation of the bathtub as described in Installation No. 1. This completes the roughing-in of the cold water supplies for these two flats.

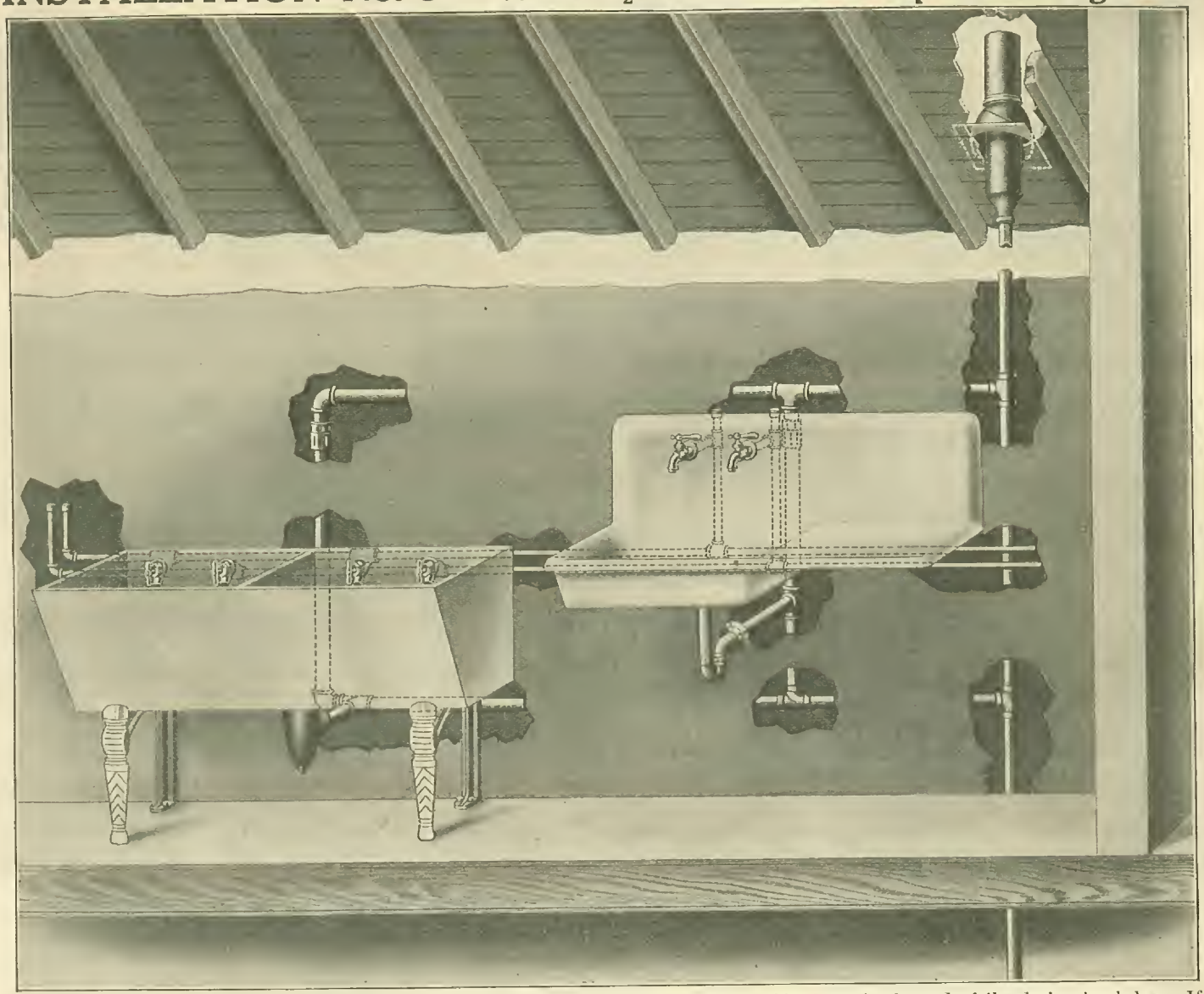
Installing Range Boiler and Hot Water Supplies

The range boilers are assembled as described for Installation No. 1 on page 8. You then proceed to run the hot water pipe as follows: From the hot water coupling at the top of the boiler on the first floor run a nipple with an elbow on the end of it, the nipple to be long enough to reach about 2 inches over the edge of the boiler. From this elbow you will run across a little, then down below the floor, and then over to immediately below the left hand faucet of the sink, where a ¾x½x¾-inch tee will be placed. The distance between the cold water and hot water faucet openings of the sink is given in the roughing-in measurements on page 39. From the last tee mentioned you will run ½-inch pipe over to immediately below the hot water faucet opening of the lavatory, where another tee will be placed to receive the nickel plated pipe furnished with the lavatory. From this tee you will run beneath the floor to where the hot water supply pipe of the bathtub will go up, and here an elbow is placed to take the nickel plated supply pipe of the bathtub.

The elbows for both the hot and cold water are brought up just flush with the top of the bathroom floor, so that the nickel plated supplies can be screwed direct into the elbows. If absolutely necessary, it is easy to screw a nipple and a coupling on these elbows to bring them sufficiently high for the connection.

With the pipe over to the bathtub, the roughing-in of the hot water supply for the first floor is completed. It is hardly necessary to describe the roughing-in of the hot water pipe for the second floor, as this follows almost exactly the same course.

INSTALLATION No. 9—With 1½-Inch Waste Pipe Throughout



The illustration above shows a sink and laundry tub on the same floor. The only pipe here shown is the waste pipe, as the waste pipe is the only pipe that presents variations from the installations described on previous pages in this book. The waste pipe is 1½-inch galvanized pipe, and the fixtures have been both vented and revented. Supply pipes should be installed in practically the same manner as described for installations previously given.

To install the roughing-in of the waste pipe as shown in the illustration, first get the height of the laundry tub trap from the roughing-in measurements given on page 39, and mark this height on the wall where the pipe will run down and out. The reason we take the laundry tub trap as a basis is that this is always lower than the sink trap. Now screw a 1½-inch drainage tee on a piece of pipe long enough to reach from the mark you have made on the wall down to where the pipe will run out of the house. Now drop this pipe through the floor, and fasten it firmly with 1½-inch pipe straps. Next screw another galvanized tee on the end of a piece of 1½-inch pipe long enough to reach from the top of the first tee we have mentioned to about 3 feet 6 inches above the floor. The last tee will be the revent tee for the sink and laundry tub. From the top of this last tee continue the 1½-inch galvanized pipe up to within 8 or 10 inches from the roof. On the very top of the pipe, you will then screw a 4x1½-inch long increaser going through the roof. Finally you will proceed to put the roof flashing over this increaser on the roof, as described on page 5, and shown in Photos Nos. 6, 8 and 9.

Screw another 1½-inch drainage tee on a piece of pipe long enough to reach from the first drainage tee above the floor over to directly under where the waste opening of the sink will be. After screwing this into the tee in the upright pipe, screw another drainage tee on a piece of pipe long enough to reach from the sink tee over to where the laundry tub trap will be, and screw this piece of pipe with the tee on the end into the sink tee. Then into the far opening of the tee for the tub drainage screw a drainage street elbow.

Next, in order to put in the revent pipe, you will screw a 1½-inch tee on a piece of galvanized pipe long enough to reach from the revent tee in the upright pipe over and directly above the sink tee in the drain pipe. Then screw a 1½-inch galvanized elbow on a piece of 1½-inch pipe, long enough to reach from this last tee directly over the drainage street elbow you have put in the end of the drain pipe below. If you follow the illustration of Installation No. 9 above this description will be clear.

Then into the revent tee above the sink screw a long screw, and also screw a long screw into the elbow at the end of the horizontal revent pipe. Next screw into the drainage tee at the sink a piece of pipe with another tee on the end, the pipe to be long enough to bring the opening of the upper tee exactly opposite where the trap for the sink will connect to the wall. The proper height will be found in the roughing-in measurements for sinks on page 39. Into the top of this tee screw a nipple or a short piece of pipe long enough to reach up to the bottom of the long screw above. Finally, make the union connection between the long screw and the pipe coming to it in the manner described on pages 5 and 6, and shown in Photos Nos. 13, 14 and 15.

Then screw into the drainage street elbow on the end of the waste pipe at the tub a piece of 1½-inch galvanized pipe long enough to reach up to the lower end of the long screw you have previously put in above, and make this union connection. This completes the installation of the waste and revent pipes, using all 1½-inch galvanized pipe and fittings, with 1½-inch drainage fittings where the waste runs.

Directions for Installing Our Ever Ready Pneumatic Water Supply Outfits

The many advantages of an Ever Ready Outfit should be carefully considered by all who have not the privileges afforded in large cities through central waterworks. The pneumatic outfit, besides affording an abundant supply of water under pressure, aerates it before it leaves the tank.

Do not overlook the fact that an Ever Ready system installed in your home furnishes you an efficient protection against fire, besides bringing within your reach comforts enjoyed by those living in large cities.

The Ever Ready system, through its simple construction, is very easily installed and operated, as you will note by reading the instructions that follow. Difficulties with our pneumatic outfits are few and of but rare occurrence, but in order that you may be able to locate and remedy them, we have given complete instructions on page 28 as to the difficulties that may be experienced with our pneumatic systems and the simple manner in which to overcome them.

Examine Your Outfit Carefully

When your Ever Ready Outfit arrives at the freight station, be sure to carefully inspect the shipment before accepting it to see that it has not been damaged in any manner, also to see that there are no parts missing. It is seldom that outfits receive injury while being shipped to our customers, as all trimmings, fittings, gauges, etc., are carefully packed, but it is best to take this precaution, as otherwise we cannot hold the railroad company responsible.

Placing Pneumatic Tank

When removing the pneumatic tank from the freight station, be sure to handle it carefully, as a heavy jar or blow is likely to cause a slight air leak, which will be difficult to overcome when the system is installed.

In locating the tank, place it where it will not be affected by freezing, by outdoor weather or by the sun's rays. When possible, it is best to place tank in basement, as it is then more easily accessible and there is also little danger of its freezing. When locating tank be sure that it stands level if a vertical tank, and if horizontal, that it pitches down slightly toward the outlet end.

If the tank is to be buried in the ground it must be placed below the frost line so there will be no danger of its freezing. Iron tank supports are furnished with each Ever Ready Outfit having a horizontal tank. They are intended merely to support the tank above the floor and hold it in a horizontal position.

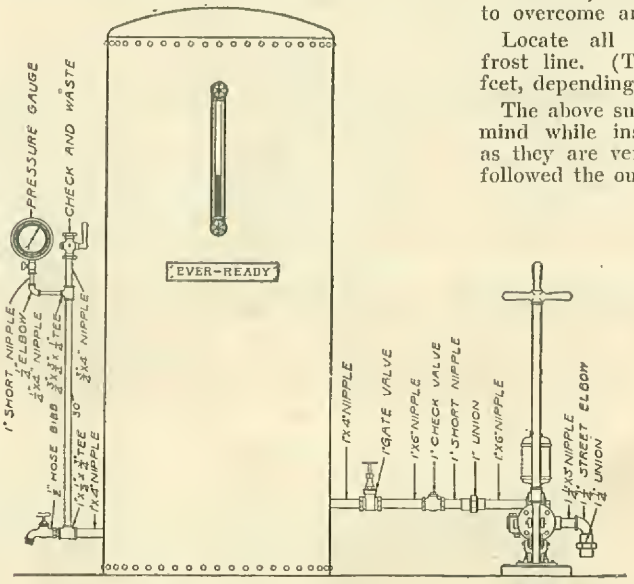
Tanks more than 42 inches in diameter should be placed on concrete or brick arches, as iron supports for larger than 42-inch tanks do not prove satisfactory.

Operating Outfits by Windmill or Belt Power

When operating an Ever Ready Outfit by windmill or belt power it is absolutely necessary that a water relief valve be located in the pump discharge between the pump and the gate valve, so there will be no danger of obtaining an excess pressure in the tank. Water relief valves for pneumatic systems are usually set at 60 pounds, and when this pressure is reached the valve opens and allows the water being forced through the discharge pipes by the pump to escape, instead of being driven into the tank. Water relief valves are listed in our General Catalog and in our Plumbing Catalog. They should always be at least 1 inch for a 3 or 3½-inch water cylinder, 1¼ inches for a 4-inch water cylinder and 1½ or 2 inches for larger size cylinders.

How Hydropneumatic Cylinders Are Operated

The Hydropneumatic Cylinder furnished with Ever Ready Pneumatic Outfits for DEEP wells is placed directly below the pump and supplies air when needed, forcing the air into the tank with the water. By referring to the cross sectional view of our Ever Ready Hydropneumatic Cylinder (Figure 5) you will note that there is a by-pass running from the top of cylinder to bottom, consisting of ½-inch pipe with a three-way cock located at the top of the by-pass and a check valve at the bottom. The hydropneumatic cylinder must always be a size larger than the water cylinder. It is made in two sizes, 3-inch and 3½-inch. The 3-inch size being used with a 2½-inch water cylinder and the 3½-inch with a 3-inch water cylinder, the largest we furnish on our Deep Well Outfits. The difference in the capacity of the water cylinder and the hydropneumatic cylinder causes a suction at each stroke, in the bottom of the hydropneumatic cylinder. This difference in capacity must be supplied by either water from the top of hydropneumatic cylinder or air from the outer atmosphere. By pressing down the controlling rod the openings in the three-way cock are so located that the connection to the top of the cylinder is closed and the by-pass is connected to the outer atmosphere. As long as the three-way cock is kept in this position the hydropneumatic cylinder will take in air at each stroke in proportion to the difference between the sizes of the two cylinders. When sufficient air has been taken in the rod is raised and the openings in the three-way cock are shifted so that the outlet to the outer atmosphere is closed and the opening into the top of the cylinder is connected to the opening in the bottom. At each stroke of the pump when the three-way cock is in this position a sufficient quantity of water is drawn from the top of the hydropneumatic cylinder to the bottom to compensate for the difference in the sizes of the hydropneumatic cylinder and the water cylinder. As long as the controlling rod is kept up no air will be taken into the system. It is very essential that the stuffing box around the piston rod of the pump is kept thoroughly packed at all times, as otherwise a small quantity of air taken into the system at each stroke of the pump will be allowed to escape and the tank will soon become waterlogged.



Working Plan No. 1.

A Few Important Things to Remember

Be sure that all connections in pneumatic tank above water line are absolutely airtight.

Make all connections in suction pipe leading from pump to source of supply absolutely airtight.

Place engine, tank and pump on solid foundation, carefully securing them so as to overcome any jarring or vibration.

Locate all underground piping below frost line. (This is usually from 3 to 6 feet, depending upon the locality.)

The above suggestions should be borne in mind while installing a pneumatic outfit, as they are very essential and if carefully followed the outfit will give perfect results.

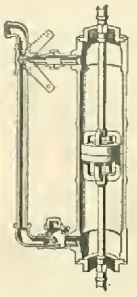


Figure 5.

Installing Outfits With Upright Tanks for SHALLOW Wells or Cisterns

Outfits
42—2043½, 42—2044½, 42—2046½, 42—2045½ and 42—2602½

After locating and installing pneumatic tank, as described above, refer to Working Plan No. 1 on this page and connect the discharge from the pump to the tank by inserting a 1-inch nipple into the tank, connecting the 1-inch gate valve to this nipple, then inserting a 1-inch nipple, to which is connected the 1-inch check valve. Between this check valve and the outlet tapping of the pump insert two 1-inch nipples connected with a 1-inch galvanized union. Pack the union with sheet rubber packing or a piece of cardboard, coating with white lead or graphite pipe cement. Before connecting the two halves of the union, locate the exact position of the pump, and if to be placed on a concrete floor, remove the wood bottom board from the pump by unscrewing the four lag screws. Mark the holes in the pump base on the cement, remove the pump and then chisel out four key shaped openings in the cement (see

Figure 6 on this page) where the lag screws are to be inserted. Replace the pump, connecting it to the pipe leading to the pneumatic tank, drop in the lag screws (square headed bolts may be used if desired), and then fill the openings with hot lead. This will give a very firm installation and is recognized as the best where pump is fastened to a concrete floor.

After pump and tank have been connected, run the suction pipe from the pump to the source of supply, being sure that all connections are made absolutely airtight as well as watertight by applying white lead or red lead to the threads. If the source of supply is a stream or lake, or if the elevation is more than 5 to 10 feet, it is best to place a foot valve on the bottom of the suction pipe. Foot valves are listed in our big General Catalog and in our Modern Plumbing Catalog.

Connect to the discharge tappings in the pneumatic tank a 1x4-inch nipple, a 1x1½x¾-inch tee and a ½-inch hose bibb, as shown in Working Plan No. 1.

To the ¾-inch opening of the tee the discharge pipe can be led straight up and connected to the house piping, or if more convenient, can be run in a horizontal direction and the pressure gauge and shut off cock connected to the horizontal run instead of to the vertical run, as illustrated.

When connecting water gauge to tank, put red lead or white lead in the tappings and screw gauge cocks up tight, also screw down jam nuts on rubber washers both at top and bottom absolutely tight and see that stem of upper cock is thoroughly packed with lamp wicking, or in case this cannot be had, ordinary grocery twine. To pack the gauge cocks, remove jam nut and wind packing after same has been saturated with oil around the stem, forcing it down with a nail, screwdriver, or any other handy tool. After a quantity of packing has been wound around stem, screw down jam nut until you are sure that connection has been made absolutely airtight.

Operation of Pump

The special hydropneumatic pump furnished with these outfits is equipped with a water cylinder and a special air compressing cylinder (note broken away view of pump, Figure 6, on this page). In order to force air into tank with the water, loosen the little screw at end of air cylinder. Air will then be drawn into water cylinder at each stroke of pump and will be forced into tank with the water. The small check valve located in air cylinder prevents the air from leaving the cylinder. At each compression stroke of the pump the small valve between the water cylinder and air cylinder allows the air to pass into the water cylinder, but prevents any water from entering air cylinder. The quantity of air required in the tank will depend upon the pressure desired.

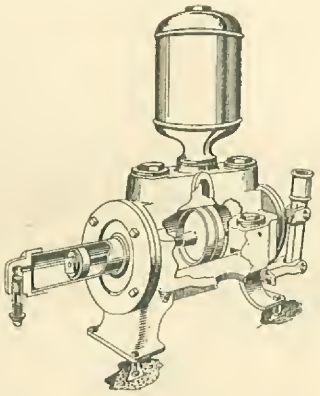


Figure 6.

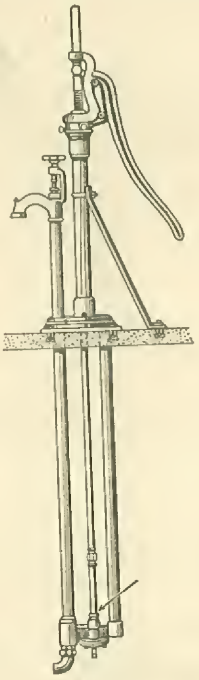


Figure 7.

If it is desired to draw all of the water out of tank at a pressure of not less than 15 to 20 pounds, it will be necessary to have a sufficient air cushion in tank to cause a pressure of 40 to 50 pounds when tank is two-thirds full of water. As water assimilates or absorbs a small quantity of air when under pressure, the air cushion will be gradually destroyed unless a fresh quantity of air is occasionally pumped into tank. It can only be ascertained through experience with your particular system as to how often it is necessary to force air into tank. An over amount of air will cause no trouble, as it will merely cause a high pressure when the tank is only partly filled with water, and an insufficient supply of air will cause tank to become what is known as waterlogged, and it will be impossible to draw all of the water from the tank. When tank becomes waterlogged it is best to drain it by means of the ½-inch hose bibb furnished for that purpose.

See page 28 for Difficulties With Pneumatic Outfits and How to Overcome Them.

Installing Outfits With Horizontal Tanks for SHALLOW Wells and Cisterns

Outfits

42—2605½, 42—2606½,
42—2608½, 42—2610½,
42—2612½ and 42—2614½

These outfits are installed and operated in exactly the same manner as our 42—2043½ to 42—2602½ systems, with the exception that the tank is located in a horizontal position and two iron tank supports are furnished in connection with the outfit. (Note Working Plan No. 2 on this page.)

See page 28 for Difficulties With Pneumatic Outfits and How to Overcome Them.

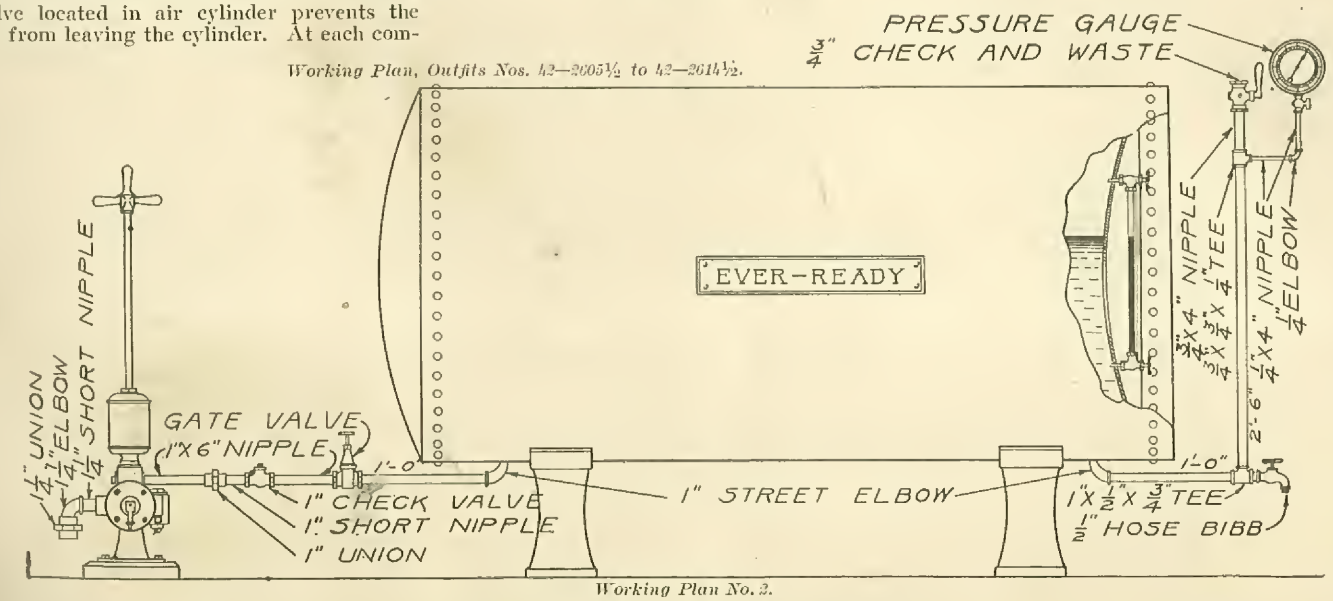
Installing Outfits for SHALLOW Wells and Cisterns, to Pump by Windmill or Hand

Outfits

42—2617½, 42—2618½,
42—2620½, 42—2086½,
42—2622½ and 42—2624½

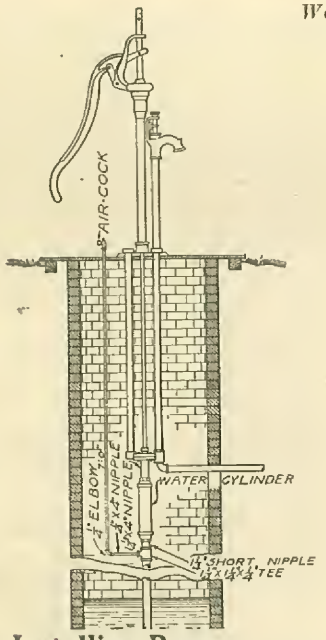
After locating and installing pneumatic tank as described on page 24, connect the discharge from pump to tank and outlet from tank to service pipe, as shown in Working Plan No. 3 on page 26.

Working Plan, Outfits Nos. 42—2605½ to 42—2614½.



Working Plan No. 2.

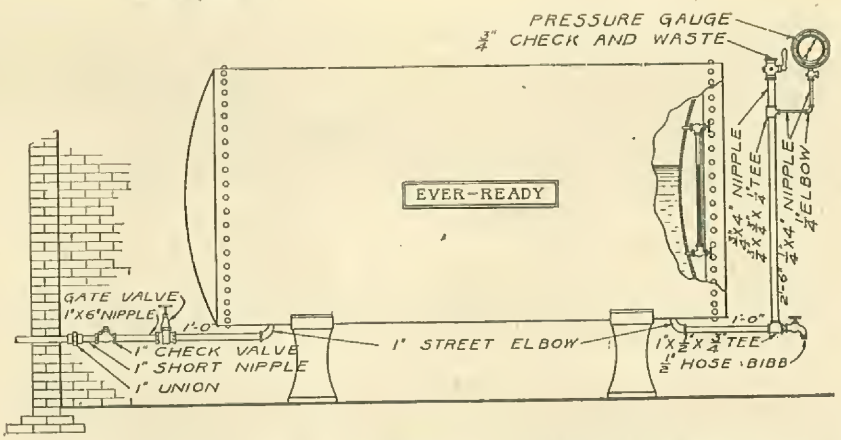
Working Plan, Outfits 42—2617½ to 42—2624½.



Installing Pump

Pump must be located directly above the source of supply, which will either be a shallow well or cistern. The cylinder must not be placed more than 10 feet above water, and the connection to pipe leading to pneumatic tank must be placed below the frost line. By loosening the set screw at side of pump it can be raised or lowered, as desired. When placing pump over a well or cistern having a concrete platform, chisel out key shaped openings as shown in Figure 6, page 25, and after inserting bolts run in hot lead and drive it down solid with a calking chisel or a small flat headed bolt. After pump has been placed, connect cylinder and suction pipe to under side of pump and locate a tee for air connection directly below cylinder. (See Working Plan No. 3.) Into the under side of tee screw a piece of 1¼-inch pipe sufficiently long to reach down into the water. From side opening of tee, connect the ¼-inch nipple, elbow, piece of pipe and air cock shown in working plan, bringing the air connection above platform where air cock can be operated at will.

Working Plan No. 3.



It is very important that the stuffing box in pump, indicated by arrow in Figure 7 (page 25), be kept thoroughly packed at all times, as otherwise the small quantity of air taken in with the water will be allowed to escape and the pneumatic tank will soon become waterlogged. To pack pump piston, remove the stuffing box nut and wind a piece of lamp wicking or common grocery twine saturated with oil around the piston, forcing it down into the stuffing box with a small screwdriver or any other handy tool. After a sufficient quantity of packing has been inserted screw down the gland until you are sure the connection is absolutely air and water tight.

See page 28 for Difficulties With Pneumatic Outfits and How to Overcome Them.

Installing Outfits to Pump by Hand or Windmill for DEEP Well

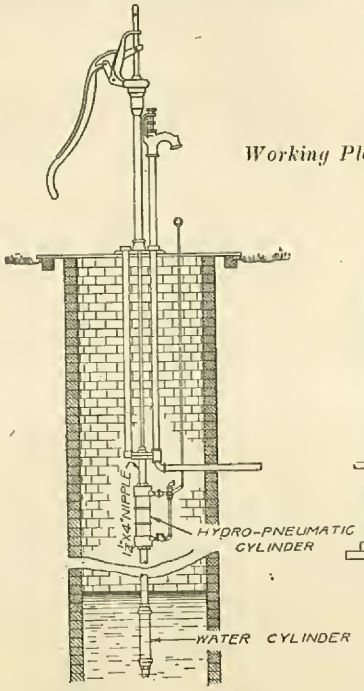
Outfits 42—2627½, 42—2630½, 42—2632½, 42—2628½, 42—2087½ and 42—2634½.

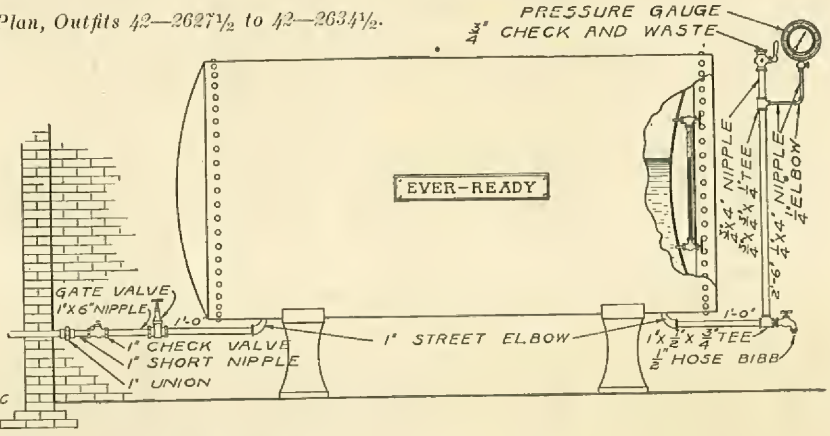
These outfits are similar to our 42—2617½ to 42—2624½ outfits just described, with the exception that they are furnished with a hydropneumatic cylinder which supplies the air instead of an air connection below the water cylinder and an air inlet pipe extending above the pump platform. After placing the tank (see instructions on installing pneumatic tank, page 24), and connecting valves, gauges, etc., as shown in Working Plan No. 4 on this page, locate the pump, placing it directly over the well. The pump furnished is the same as used in our 42—2617½ to 42—2624½ outfits and is installed in the same manner. Directly below the pump connect the hydropneumatic cylinder, securely screwing the rod couplings and lengths of rod together. After the hydropneumatic cylinder has been attached connect the rod leading from the water cylinder to the rod extending from the hydropneumatic cylinder and then screw the suction pipe into the bottom of the hydropneumatic cylinder.

From the three-way cock extend the controlling rod (see Working Plan No. 4) up through the pump platform. This controlling rod, when pushed down as far as it will go, allows air to be taken into the system with the water. When a sufficient quantity of air has been forced into the pneumatic tank, pull the rod up, the air supply will then be cut off and the pump will raise water only.

Deep well outfits, where the water is raised from 25 to 50 feet, should not be operated at more than thirty-five to forty strokes per minute; where the level of the water is from 50 to 100 feet, the pump should be operated at not more than thirty strokes

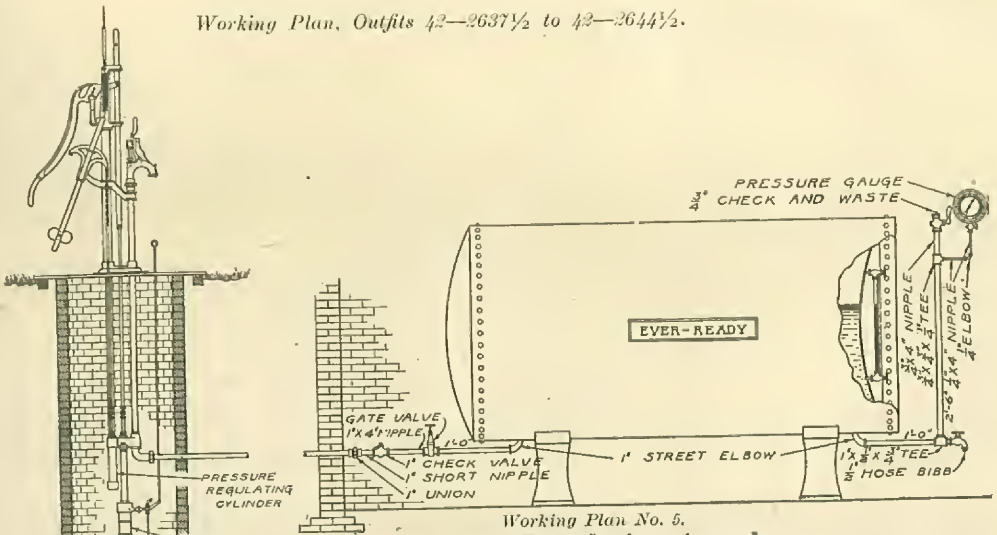
Working Plan, Outfits 42—2627½ to 42—2634½.





Working Plan No. 4.

Working Plan, Outfits 42—2637½ to 42—2644½.



Working Plan No. 5.

per minute; when more than 100 feet, at from twenty to thirty strokes, depending on size of cylinder and length of stroke.

See page 28 for Diffienlties With Pneumatic Outfits and How to Overcome Them.

Installing Outfits 42—2637½, 42—2638½, 42—2640½, 42—2088½, 42—2642½ and 42—2644½.

These outfits are installed in exactly the same manner as the 42—2627½ to 42—2634½, inclusive, as described on the preceding page, with the exception that the pump is equipped with a windmill regulator attachment for throwing the mill in and out of gear. In order to obtain the best results it is essential that the stuffing glands of the regulating cylinder and the pump piston be kept thoroughly packed, as otherwise the air taken in by the hydropneumatic cylinder will be allowed to escape and the outfit will be greatly reduced in efficiency.

Connecting Regulating Attachment to Windmill

In order to obtain the best results with the windmill regulator attachment *it is necessary that the windmill be kept thoroughly lubricated at all times,* so that it can be easily thrown in and out of gear. Connect end of rod to which weight is fastened (see Working Plan No. 5) to wire controlling windmill, being careful to take up all slack when weight lever is standing in a vertical position, so that when regulating cylinder pulls lever down windmill will be thrown out of gear without slack first being taken up. To regulate pressure at which windmill is to be thrown in and out of gear shift weight on regulating lever either down toward end or up toward fulcrum. When shifting toward end, pressure obtained before mill is thrown out of gear will be increased and when weight is moved toward fulcrum, mill will be thrown out of gear at a lower pressure.

See page 28 for Difficulties With Pneumatic Outfits and How to Overcome Them.

Installing Outfits for DEEP Wells to Pump by Engine, Hand or Windmill

Outfits 42—2658½, 42—2660½, 42—2662½, 42—2664½, 42—2666½ and 42—2668½.

After placing tank as explained on page 24, connect it to the discharge pipe leading from the pump, installing the valves as shown in Working Plan No. 6 on this page. The gate valve should always be nearest the tank so that if the water relief valve or check valve ever require attention the gate valve can be closed and the valves repaired without the necessity of first emptying the tank. The water relief valve should be located between the pump and the check valve, the check valve between the water relief valve and the gate valve, and the gate valve between the check valve and the tank.

Securely screw together the pump head, hydropneumatic cylinder, water cylinder and pipe and rod. Lower into well and fasten pump to platform.

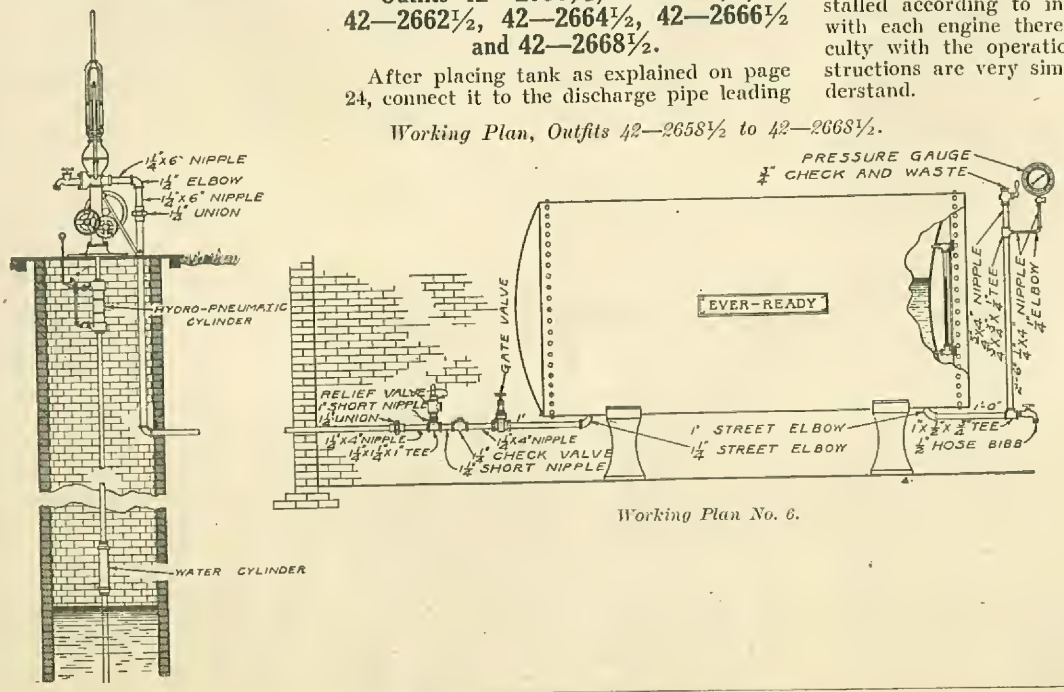
Placing Pump

The hydropneumatic cylinder should always be placed directly below the pump and the controlling rod extended up through the pump platform, as explained in the discussion of hydropneumatic cylinders on page 24. The cylinder rod can be connected to coupling in hydropneumatic cylinder by raising handle of pump; this will force the rod down to the full length of the stroke, namely, 10 inches, and the rod and coupling can then be securely screwed together. The pump rod from the top of the pump down to the water cylinder should be screwed together tight so there will be no possible chance of lost motion, which would cause hammering, and soon destroy the threads on the rod and in the couplings. The working head or pump standard should be securely fastened to the pump platform. See section explaining the installation of pump heads on page 26.

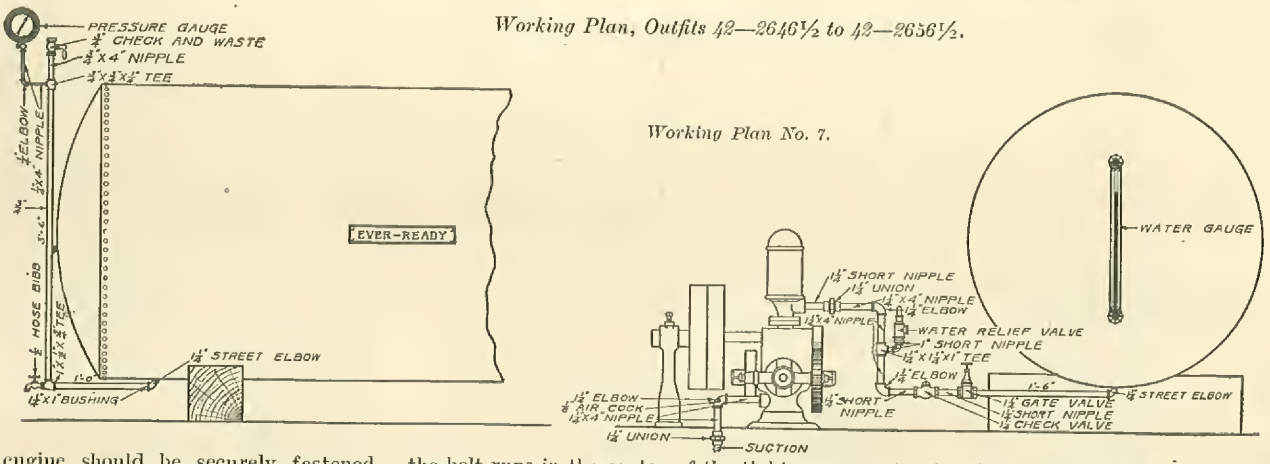
Locating Gasoline Engine

Our Economy Gasoline Engine is carefully tested before being shipped and when installed according to instructions furnished with each engine there should be no difficulty with the operation of it. These instructions are very simple and easy to understand.

Working Plan, Outfits 42—2658½ to 42—2668½.



Working Plan No. 6.



Working Plan, Outfits 42—2646½ to 42—2656½.

Working Plan No. 7.

The engine should be securely fastened to a solid foundation. It is best, when possible, to place it on a concrete foundation, setting the bolts in concrete with lead. This is done by chiseling out a key shaped hole for each bolt in the concrete, having the hole narrower at the top than at the bottom. The bolt is then dropped into this hole and hot lead run in around it. This lead holds the bolt rigid and fastens the engine securely to the floor.

Lining Up Engine With Pump

The pulley wheel on the engine should be in line with the pulley wheels on the pump, as otherwise the belt is likely to leave the pulleys when the engine starts. Alignment can be ascertained by placing the belt on the engine and pump pulleys and turning the engine by hand to see how the belt runs. The position of the engine can be shifted or turned as may be required, until the belt runs in the center of the tight pump pulley and the side of the engine pulley when pumping water and then runs on the opposite side of the pulley when shifted over to the loose pulley on the pump.

See below for Difficulties With Pneumatic Outfits and How to Overcome Them.

Installing Outfits for SHALLOW Wells or Cisterns, to Pump by Power Only

Outfits 42—2646½, 42—2648½, 42—2650½, 42—2652½, 42—2654½ and 42—2656½

Place tank as explained on page 24 and connect the inlet and outlet pipes, also the trimmings as shown in Working Plan No. 7.

Place the pump where it is not likely to freeze, being sure to fasten it securely to the foundation. It is best to fasten pump in concrete foundation by means of bolts inserted in the cement with lead as shown in Figure 6, on page 25. Securely fasten engine to foundation as explained in instructions on this page and page 27, connecting suction pipe and air intake valve. The elbow tapped for ⅛-inch air valve is connected to the suction pipe at the pump. Into the smaller tapping the ⅛-inch air cock is screwed. By opening this cock, air is taken into the pump with the water, and by closing it water only is forced into the tank. Be sure that the pipe leading from the pump down into the well, cistern or other source of supply is absolutely airtight, as otherwise the efficiency of the pump will be greatly reduced. It is best to make these connections with white lead or red lead, as this will insure a tight joint.

See below for Difficulties With Pneumatic Outfits and How to Overcome Them.

Difficulties With Pneumatic Outfits and How to Overcome Them

Tank Becoming Waterlogged

Pneumatic tanks will become what is known as waterlogged if the proper amount of air is not supplied to tank to maintain an air cushion. Water, when under pressure in the tank, will absorb part of the air. This air must be replaced. All of the air in tank will in time be absorbed by the water and the tank will become filled with water only and there will be no air to compress and drive the water out of the tank. When a pneumatic tank becomes waterlogged it should be drained by opening the draw-off cock at the bottom. When the tank is emptied it will fill with air and when water is again pumped into it there will be an air cushion sufficient to cause a pressure of about 30 pounds when the tank is two-thirds full of water. It is best to maintain sufficient air in the tank to cause a pressure of from 30 to 40 pounds, or, if so desired, 50 to 60 pounds, when the tank is two-thirds full of water. This will be sufficient to force all the water out of the tank and up into the fixtures without the necessity of starting the pump.

Air Leaks in Tanks

It sometimes happens that tanks receive rough handling when being shipped and are sprung by being jarred or receiving heavy blows, so that a small leak is started at some one of the seams. Should this air leak occur above the water level it will allow all the air to escape and the tank will become filled with water. Air is also often allowed to escape by the upper water gauge cock not being properly connected to the tank or the water gauge glass gasket not being sufficiently tight, also by the stem of the upper gauge cock not being properly packed. It is necessary that all connections to the tank above the water line be absolutely airtight, as otherwise the air cushion will soon be destroyed.

Locating Air Leaks

To locate an air leak in a pneumatic tank above the water line, apply a strong solution of soap suds to the different connections and also the seams and rivets of the tank after a pressure has been created. By the air bubble that appears the exact location of the leak can be found.

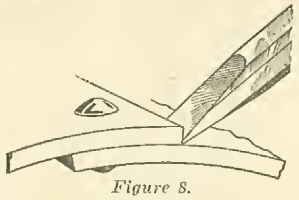


Figure 8.

Overcoming an Air Leak

If a small air leak forms at a seam or rivet head, take a cold chisel and hammer and lightly tap the metal directly above the leak at the seam or rivet head, forcing it down into the leak. (See Figure 8.) If the leak is large, allowing the air to escape rapidly and cannot be overcome in this manner, write us, explaining in detail the nature of the leak and where it is situated.

If the leak is at one of the connections to the tank, the upper water gauge cock or the upper plug, remove the fitting and apply a liberal coat of white or red lead, then screw the fitting back into the tank, being sure it is drawn up tight. If the leak appears around the stem of the upper water gauge cock, remove the jam nut and wind a piece of lamp wick or grocery twine, saturated with oil, around the stem, screwing the nut up tight. This will prevent the air from escaping around the stem. A gasket is furnished with each gauge cock to fit around the end of the glass where it enters the cock, and by screwing the jam nut up tight the rubber gasket is forced against the glass and prevents any air from escaping.

Pressure Decreasing in Tank Not Due to Air Leak

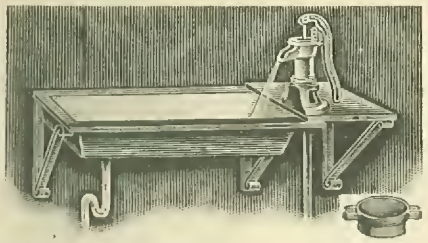
Should you find that pressure in the pneumatic tank decreases during the night when not in use, it will be due to two things: The water is either allowed to escape through a defective plumbing fixture, such as a sink faucet or closet float valve, or the water flows back through the check valve between pump and tank and back into the well. The leak can be located by closing the shut off cock on the outlet leading from the tank to the house supply. If it is still found that the pressure decreases, the trouble can, no doubt, be located in the check valve. To inspect the check valve, first close the gate valve and then loosen the cap at the top of the check. It sometimes happens that if no strainer or foot valve is placed on the end of the suction pipe, small pebbles or other sediment become lodged between the check valve and its seat, allowing the water to pass back through the pump into the source of supply. If the seat or valve have been worn so they do not set firmly, the valve can be ground down into the seat by applying fine emery and turning the valve on its seat. This will regrind it and make it absolutely tight.

Directions for Installing Sink Outfits

Installing 42—9075¼ Hercules Sink Outfit.

The outfit consists of a cast iron sink, porcelain enameled inside; a pitcher spout pump, the cylinder of which is brass lined; a pump board, three steel sink brackets, a lead sink trap, a piece of 1¼-inch pipe 3 feet long and a piece of 1½-inch pipe 2 feet 6 inches long.

Fasten two of the brackets securely to the wall so when the sink is placed upon them the top edge or rim will be level, or as near so as possible, and the distance from the floor to the top of the sink will not be over 2 feet 6 or 8 inches. The third bracket is then fastened to the wall so the



42—9075¼

Coupling.

outer edge of the pump board rests upon it, while the other end is supported by the sink rim. Slant or pitch the board slightly toward the sink so that any water spilled upon it will drain into the sink. After cutting or boring a hole through the board for the suction pipe, the pump is fastened to the board with ordinary iron wood screws or bolts. The sink, pump and board are then placed upon the brackets, and the strainer is fastened to the sink with the two short screws and the trap with the two long ones. The trap is connected by slipping the sink coupling (see small illustration) over the end of the trap, after which the opening in the trap is flared out by beating it from the inside with a round rod or smooth piece of hardwood until it fits over the opening in the sink. Ordinary putty is then put between the trap and sink outlet and the coupling is drawn up tight with the two long bolts or screws. When putting the putty between the sink and the trap, be careful that none of it is forced down into the trap, as it will stop up the opening. At the bottom of the trap is a brass collar or bushing threaded on the outside. To this the piece of 1½-inch pipe is connected. The piece of 1¼-inch pipe is screwed into the bottom of the pump. This will bring the two pipes to the floor and it is only necessary to run the 1¼-inch suction pipe to the cistern or well and the 1½-inch waste pipe to the sewer, catch basin or tile drain which is to receive the waste water.

42—9076¼

The pitcher spout pump included with this outfit must not be placed more than 20 feet above the surface of the water in the well or cistern, as it will not work satisfactorily at a greater depth.

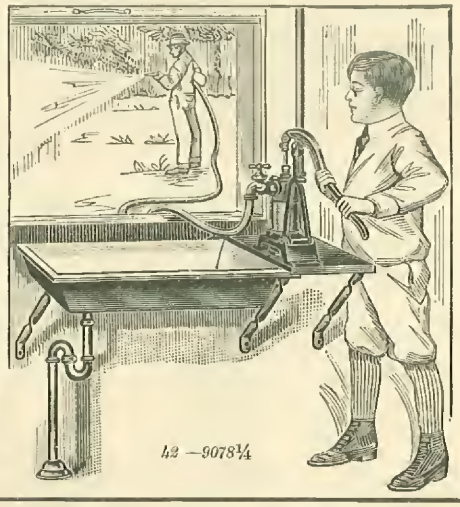
Installing 42—9076¼ Compact Sink Outfit

The outfit consists of a cast iron sink, porcelain enameled inside; a pitcher spout pump with iron cylinder; a pump board, three steel sink brackets and a cast iron sink trap.

The outfit is installed in the same manner as 42—9075¼. No suction and waste piping is included, however, and the trap is made of cast iron instead of lead. The trap is made to fit over the sink outlet and it is only necessary to put the putty between the sink opening and trap and draw the trap up tight with the two long sink bolts. The waste pipes from the traps can be run to the wall, or to the floor, by using a street elbow (see illustration).

Installing 42—9078¼ Perfection Sink Outfit

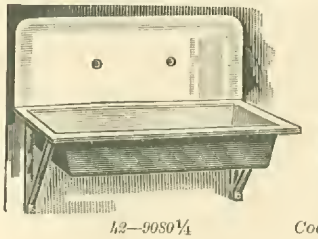
The outfit consists of a cast iron sink, porcelain enameled inside; a brass body cistern force pump with a faucet spout threaded for connecting to a garden hose; three sink brackets; an oak pump board and a nickel plated brass trap threaded at the bottom for connecting to iron pipe.



42—9078¼

This outfit is installed in exactly the same manner as the Hercules Outfit described on this page excepting that there is no piping included and the trap is made of brass, nickel plated, instead of lead. To the top of the trap a sink coupling is screwed which is fastened to the sink with the two long sink bolts, the same as in the Hercules Outfit. Be sure to put putty between the coupling and sink outlet before tightening up the screws, but do not use too much or it will be forced into the drain pipe and stop it up. After the sink has been placed upon the brackets, the pump attached to the pump board and the trap fastened to the sink, connect 1½-inch galvanized pipe to the bottom of the trap for leading the waste water to the drain and use 1¼-inch galvanized pipe for the water supply from the cistern or well to the pump. If you desire to force water to another fixture or to a tank in the attic, unscrew the iron plug at the top of the pump and into this opening screw 1-inch galvanized pipe.

Installing 42—9080¼ Outfit



42—9080¼

Cock Hole Cover

The outfit consists of a cast iron sink, porcelain enameled inside; a cast iron sink back, enameled outside, and two steel sink brackets.

The brackets are securely fastened to the wall so when the sink is placed upon them the upper rim is level. The distance from the floor to the top edge of the sink should be about 2 feet 6 or 8 inches, but when faucets are used the position of the sink will be governed to a large extent by the location of the faucet connections in the wall. After putting the sink on the brackets, putty is put on the edge next to the wall and the back placed upon it. Any surplus putty which squeezes out of the crack between the sink and back is removed and the surface of the putty smoothed down with a knife or other flat piece of metal. If faucets are used, the flanges upon them will hold the back securely in place; if, however, the sink is not to be fitted with faucets the back can be held against the wall by using two cock hole covers (see small illustration). The nuts, washers and gaskets are removed and the ends of the stems are pointed with a file or grindstone; two wooden plugs or a piece of wood is then fastened to the wall and the cock hole covers screwed into it the same as an ordinary wood screw.

The waste outlet of the sink is intended for connection to a lead trap in the same manner as explained in Outfit 42—9075¼.

Installing Gas Piping

Piping a building for gas is not a complicated operation, but requires care and good judgment. Never use a fitting or piece of pipe that might develop a leak after it is installed. As cast iron fittings crack when put under too great a strain and are more or less porous, they should never be used for gas.

Remove all burrs from inside of pipe and be sure that thread has not been damaged, before attaching a fitting. Apply red or white lead to all threaded connections, putting it on the male thread and not on the inside threads of fittings. Never use a union in a pipe that is to be concealed, and when placing unions in exposed piping always pack them with a gasket made of leather or some other substance not affected by the gas. Rubber gaskets cannot be used, as gas contains oil and chemicals that rot the rubber very rapidly.

When piping for city gas pitch the pipes so any moisture that may accumulate will flow back to the main service pipe, leading to the meter. When an acetylene generator is to supply the gas, pitch the piping so all moisture will flow back to the main riser and put a moisture trap at the bottom of the riser as illustrated by Figure 10, page 30.

The pipe sizes are figured according to the amount of gas they must supply or the number of ⅜-inch openings, or their equivalents, to which they connect (on page 30, see under the heading, "Size of Pipe Required and Equivalents"). A sketch of the piping required for the ordinary residence based on this method of figuring is shown at the top of page 30 (Figure 9).

All gas companies furnishing buildings with gas, from mains laid under ground, issue a set of rules governing the piping of buildings, which must be followed. If the gas is to be taken from an outside main, be sure to obtain a copy of the gas company's rules before piping your building.

For the benefit of those who intend to obtain gas from an acetylene generator or some other kind of gas machine located on their own premises we quote the following from "Gas Fitters' Rules," adopted by The Peoples Gas Light and Coke Co., and The Public Service Co. of Northern Illinois, two of the largest companies selling artificial gas in this country:

Testing

Before fixtures are installed, the piping must stand a pressure of 6 inches on a column of mercury without showing any drop in the column for a period of ten minutes.

After fixtures are installed, piping must stand a pressure of 1 inch on a column of mercury without showing any drop for the same period of time. (These tests are made with a mercurial gauge. An ordinary spring gauge can be used, however, by simply attaching to piping. Gas companies will not install meters until they have made their own tests.)

Obstructions in Pipe

All piping must be free from burrs and other obstructions.

Defective Material

Split pipe or fittings repaired with cement or lead must not be used. Calked fittings must not be used.

Material Not Allowed

Unions or bushings must not be used in work that is to be concealed, and cast iron fittings are prohibited in either exposed or concealed work.

Capping Outlets

All outlets must be securely closed with iron caps until fixtures or appliances are installed.

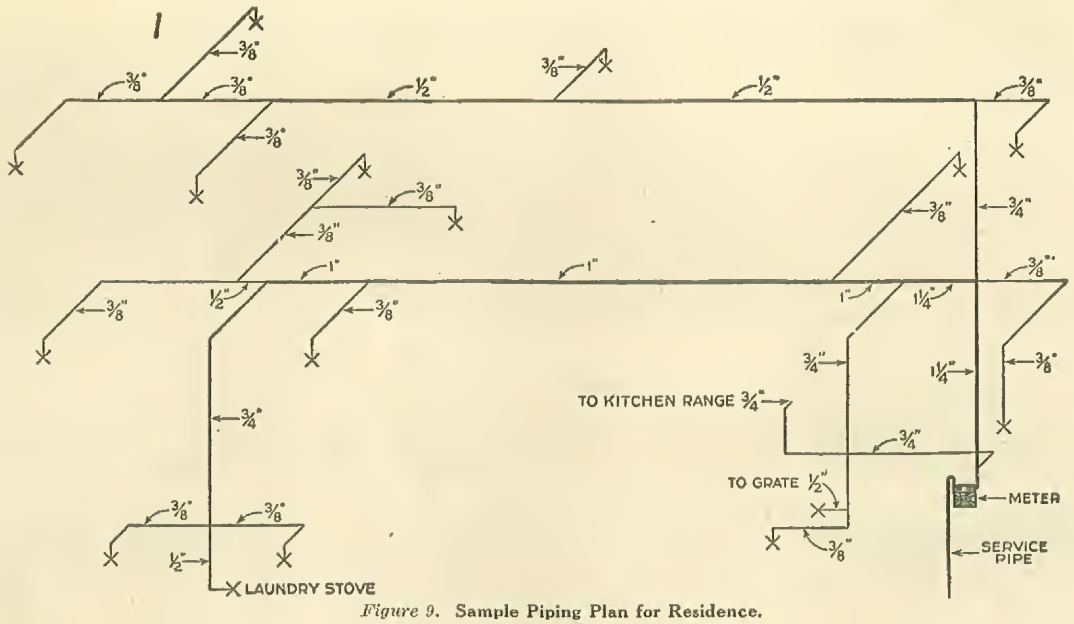


Figure 9. **Sample Piping Plan for Residence.**

Piping on Outside Wall

When it is absolutely necessary to run pipe on an outside wall a furring strip must be placed between the pipe and the wall.

Piping on Masonry Walls

All piping run on masonry walls must be securely fastened thereto by strapping it to wooden plugs driven into the walls.

Imbedding in Concrete or Cement

When pipe is to be imbedded in concrete or cement, it must be covered with tar paper or other suitable covering, or laid in a conduit pipe.

Drop From Branch Lines

Drops on branch lines should have an offset of 4 inches and they must be dropped square. Outlets for side brackets may be either square bends or long drop elbows. The use of nipples is prohibited.

Connecting Appliances

Fitters are particularly requested to see that all gas burning appliances are connected solid with iron pipe. Under no circumstances will this Company approve of the use of lead pipe or rubber tubing.

Size of Pipe Required and Equivalents

The amount of gas passing through a ⅜-inch pipe under normal pressure is approximately 10 cubic feet of gas an hour. This capacity of a ⅜-inch outlet has been called an equivalent, and the table of pipe sizes below has been figured out on this basis and is to be used in estimating the size of the pipe necessary to give an adequate supply of gas to an appliance.

For example, a range for a flat or residence requires five times the quantity of gas supplied by a ⅜-inch pipe, or five equivalents.

Range for flat or residence....5 equivalents
Grate or log.....3 equivalents
Laundry appliance.....3 equivalents
Water heater.....4 equivalents
Gas arc lamp.....2 equivalents

The number of ⅜-inch equivalents for any appliance not mentioned in the above table may be determined by dividing the total consumption per hour of that appliance by ten.

Consumption of gas-fired steam boilers may be obtained by assuming 80 cubic feet of gas per hour for each horse-power.

Size of Opening

To determine the size of the opening required when risers are connected at the meter end, the combined loads of the risers must be added together.

Size of Riser for Combined Lines

When two or more lines of pipe are connected in order to be supplied by one riser, the riser must be of sufficient size to supply the combined load of all the lines.

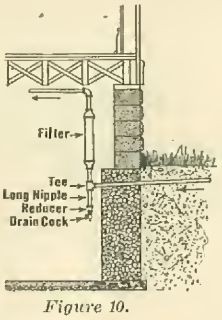


Figure 10.

Office Buildings, Schools, Hospitals, Residences and Flats, Under Single Pipe System

Size of Pipe in Inches	Feet of Pipe Allowed	No. of ⅜-In. Equivalents Allowed
⅜	30	2
½	40	4
¾	60	10
1	70	15
1¼	100	30
1½	150	60
2	200	100
2½	250	200
3	300	300
4	450	500

NOTE—Any ceiling 20 feet high or over must have ½-inch drops. In a residence or a flat building, a ¾-inch outlet for a range in a kitchen may be used to supply two appliances, such as a range with a ¾-inch outlet extended full size, and a water heater or a laundry appliance with a ½-inch extension.

Automatic Water Heaters

An automatic water heater must be supplied with a separate pipe. For sizes and lengths allowed see table below.

A pipe run, to supply any automatic water heater, not shown in the following table, must be one size larger than the opening of the appliance. The length allowed may be ascertained from table in the center column on this page.

Humphrey Heater	Pittsburgh Heater	Ruud Heater	Size of Pipe in Inches	Feet of Pipe Allowed
20	..	1½	1	100
30	..	...	1	100
2A to 2C	2	...	1	100
.....	..	2½	1	100
3A to C	3	3	1	100
4A to C	4	4	1¼	150
6A to C	6	6	1½	200
8A to C	8	8	2	250

Risers in Laundries, Etc.

Risers may be run to laundries, furnace or boiler rooms, provided the risers are not placed closer than 10 feet to any appliance and in no case directly in front of a boiler or a furnace.

Risers in Cold Basement

A riser in an unheated basement should be located 4 feet or more from an outside wall. If, however, the owner desires the meter set on the outside wall, this will be permissible, provided a false partition of wood is built and an air space of 2 inches is left between the partition and the wall.

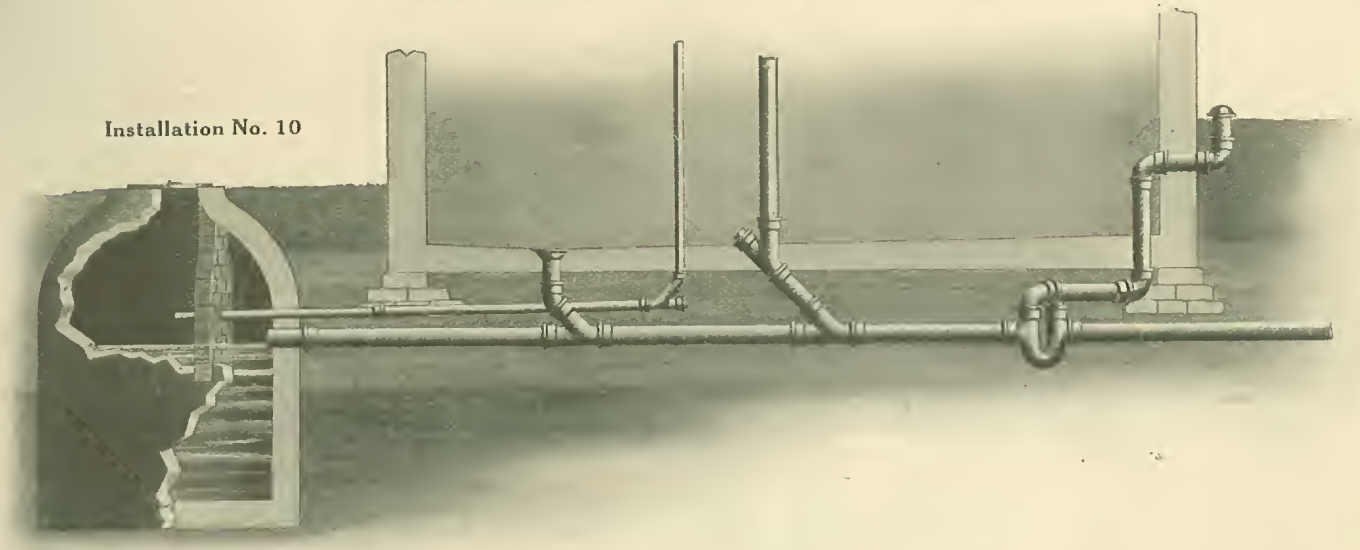
Electric Cut-Off Box

A riser must never be brought to a point nearer than 5 feet from an electric cut-off box.

Prohibited Locations for Risers

A riser must not end in any place where the gas company's meter will be exposed to frost or dampness, or liable to injury from any cause.

Underground Sewer System for House, Complying With Most City Requirements



Installation No. 10 above shows a cast iron sewer system in the ground beneath the house to receive the waste not only from the bathroom fixtures (closet, lavatory and bathtub), but also from the kitchen sink, slop sink and laundry tubs. The installation here shown is to be connected to the public sewer pipe in the street, and will comply with most plumbing ordinances. Although it may not strictly conform to every ordinance, it can easily be made to so conform by a few slight changes in the fittings, as required by the ordinance.

In the above, we did not allow for any rain leaders or downspouts. The connection is simple, but it would be difficult for us to show it in this diagram on account of lack of location.

In this installation we show a catch basin (cesspool), presumably at the rear of the building. Such a catch basin is very advisable to collect the grease coming from the kitchen, which if not separated in this way, would finally stop up the sewer pipes. Directions for building a catch basin will be found on page 34. The kitchen, laundry tub and basement sewage is carried to the catch basin in 2-inch cast iron sewer pipe, emptying as shown on the farther side of the bricked wall built in the upper part of the catch basin to form a trap. To construct this trap, set a 4x4-inch or other substantial wooden plank in the catch basin walls, as shown in the illustration, and build a brick wall on this plank as a foundation, up to the top of catch basin.

At the base of the 2-inch soil pipe coming down from above, you will notice an eighth bend calked into the side opening of the 2-inch Y. This connection serves two purposes: It makes an easy, gradual bend, and besides, into the running end of the Y is calked a 2-inch clean out plug with a removable screw in the end of it, leaving an opening through which the pipe may easily be rodded out at any time, in case it should clog. The 2-inch horizontal pipe should, of course, be pitched towards the catch basin.

The main sewer consists of 4-inch soil pipe, and is shown receiving the water from the catch basin, a floor drain and the discharge from the bathroom fixtures coming down from above. This main line extends from the catch basin just outside the building line, and also includes a fresh air inlet connected into a running trap, as shown at the right hand side of the illustration.

As this sewer pipe should be given a pitch at least ¼ inch to the foot, it would start from the catch basin, of course, on the side of the bricked wall trap opposite the side on which the kitchen sewage empties. If your arrangements are similar to the arrangements shown in the illustration, you would first calk two lengths of soil pipe together, and then into the end of the second length you would calk a 4-inch Y to take the water from the floor drain. Into the other end of this Y you would calk another length of soil pipe, and into the end of this length another Y to receive the bathroom drainage. Next, another length of soil pipe would be calked into this last Y, and the running trap on the end of this length. Then, into the other end of the trap, you would calk a length or more of soil pipe to extend outside the building or wherever desired.

Do not cover up the soil pipe within a few feet of the Y in the main sewer receiving the drainage from the bathroom until the suspended waste leading to the roof has been connected.

Of course, make as few horizontal calk joints as possible, as these are somewhat more difficult to make than when the soil pipe is held upright. Full directions for making horizontal calk joints will be found on page 37, and illustrated by Photo No. 39. Directions for making ordinary calk joints are also printed on page 37.

As the illustration above shows, you would calk an eighth bend into the Y that is to receive the drainage from the floor drain, and into the top of the eighth bend, you will set the floor drain. Next, into the Y that is to receive the bathroom drainage, you would calk another Y. It may, of course, be necessary to have a short piece of pipe in addition to the Ys in order to make the connection with the pipe coming down from the bathtub, but this will make no difference in the general arrangement. When the second Y is set, calk a clean out plug into the side of it for rodding purposes, in case any stoppage occurs. Then make the connection with the soil stack going up to the bathroom.

Next, measure a piece of soil pipe long enough to reach from the quarter bend that is shown set in the top of the running trap to the quarter bend that will turn the pipe upward just inside the wall of the building. When you have cut this piece of pipe the required length, calk a quarter bend on each end of it, one bend being turned up, the other being turned down. After this piece of pipe with the bends on each end has been calked into the running trap, extend a pipe up inside the wall, then through the wall with a piece of pipe long enough to have another quarter bend calked on the end of it. Into this last quarter bend outside the wall, calk a piece of 4-inch soil pipe with a ventilating cap on the end, the pipe to be long enough to reach into the open air.

INSTALLATION No. 11
With All Sewage Emptying Directly Into One Main

The illustration of Installation No. 11, on page 32, shows all the sewage from the closet, sink, and, in fact, all the kitchen and bathroom fixtures emptying direct into 4-inch soil pipe laid in the ground beneath the house. There is no catch basin to separate the grease from the sink and laundry tub waste, as was allowed for in Installation No. 10 shown on this page. Installation No. 11 is very easy to install and gives good results, but will not be accepted by the plumbing ordinances in many cities. If, however, your plumbing ordinance will permit, this system will be satisfactory if the city sewer runs directly past the house, or at least at no great distance.

The illustration gives a view of the underground sewer pipe, looking directly down

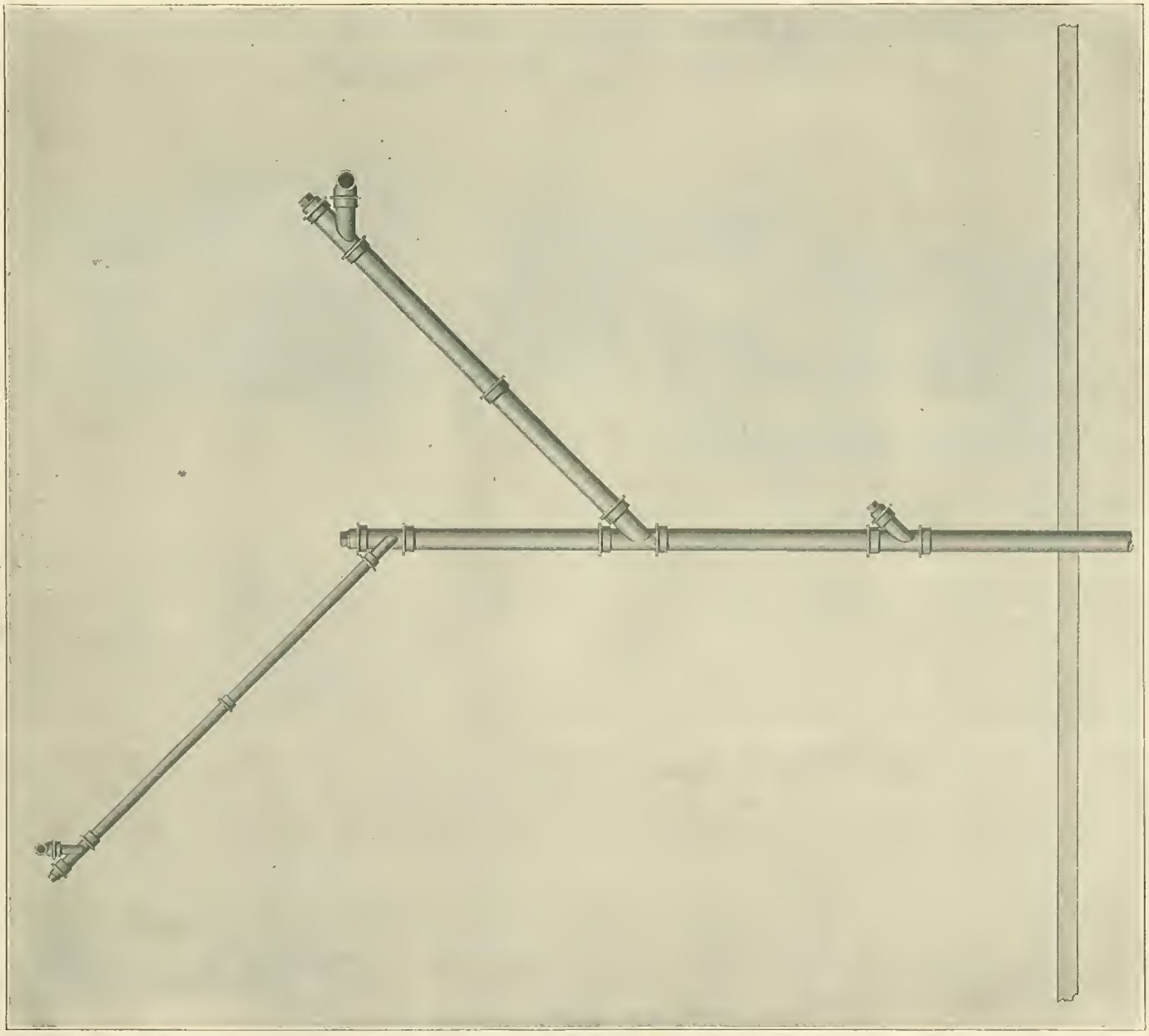


Illustration of Installation No. 11.

on it from above. The line at the right hand side of the illustration represents the house wall at the front of the building. The kitchen drain comes down in the lower left hand corner, and the bathroom drainage in the upper left hand corner. If your kitchen and bathroom are placed differently, your pipe will, of course, not run as shown in the illustration.

Assuming that your sewage will empty into the city sewer at the front of the building, you will naturally pitch your sewer pipes that way. The practical procedure would then be: First, to calk a rod-out plug into a 4x2-inch Y, this being the Y shown at the end of the center line of pipe in the illustration. This is the fitting that makes the connection between the kitchen drainage and the bathroom drainage.

Next calk a regular 4-inch Y on the hubless end of a length of 4-inch soil pipe, and into the top of this length of soil pipe calk the 4x2-inch Y we have already mentioned. Be sure you have these two Ys turned in opposite directions, in case the waste pipe will come from opposite directions, as shown in the illustration. After you have completed this calking, you will lay this length of soil pipe with the two Ys on it in the ground, being sure to give it a pitch towards the front of ¼ inch to the foot.

Then you will calk the regular 4-inch Y branch into a length or possibly two lengths of soil pipe—whatever would be required to carry the 4-inch soil pipe line to within a couple of feet of the front wall where it would pass through. Here you will calk in another Y branch with a clean out plug calked in the side opening. The object of this Y and plug is to make provision to rod out the sewer in case it becomes clogged. From this last Y, you will, of course, continue outside the wall.

For the sink waste, you would first calk a 2-inch rod-out plug into the side of a 2-inch Y. Then calk this Y into a length of 2-inch soil pipe, and to this, more lengths until you have a pipe line long enough to reach from the sink waste as far as the 2-inch side opening of your 4x2-inch Y at the end of your main sewer line. Lay all this 2-inch pipe in the ditch prepared for it, and calk into the 2-inch side opening of the Y just mentioned. Here, of course, it will be necessary to make a horizontal calk joint, as described on page 40. The same procedure will be followed with reference to the 4-inch sewer pipe that will carry the bathroom drainage into the Y in your main sewer line. Our illustration shows the Y at the end of the bathroom branch with a plug calked into the end of it, and the branch running into the Y in the center sewer pipe line. Finally, into the side openings of the 2-inch Y branch for the kitchen drainage, and the 4-inch Y branch for the bathroom drainage, you will calk eighth bends to make connection with the kitchen drain and bathroom drain, respectively, that come down from above.

INSTALLATION No. 12

Consisting of Cesspool and Septic Tank Connections, Advisable Where There Is No Public Sewer Connection

We have previously shown in our descriptions of Installations Nos. 10 and 11 how to install sewage systems which are to be emptied into a city sewer. Where there is no public sewer connection, however, we highly recommend a system like that illustrated above, which will take care of all the sewage from kitchen sinks, slop sinks, laundry tubs, floor drains, water closets, lavatories, and bathtubs, collecting and preparing the waste for final disposal by running into field tile or distributing ditches, or a filter bed, or even into a running stream that is not used for drinking purposes. A full description of how to construct cesspools and septic tanks, also how finally to dispose of the drainage, is given on pages 34 to 36. If you have no public sewer near you, by following our directions and suggestions with reference to the above installation, and the further instructions on pages 34 to 36, you will be able to dispose of all the waste water in the most convenient and sanitary way.

We recommend emptying all the kitchen drainage from sinks, laundry tubs, etc., first into a cesspool which collects all the grease, and then carrying the water from which the grease has been removed from the cesspool into the septic tank, where, with the bathroom drainage, it is finally disposed of through the siphon in the second or siphon chamber of the septic tank, and from there conducted wherever it is to be finally disposed of. The reason for having both a cesspool and a septic tank is that the grease from the kitchen drainage greatly hinders if it does not practically prevent the activity of the bacteria which help clear up the bathroom sewage in the septic tank, while if the grease is separated from the kitchen sewage, such action will go forward without hindrance.

The cesspool (catch basin) shown in the illustration is a water-tight cesspool, built of concrete. As explained on page 34, tight cesspools can be built of concrete, brick or stone. There is another variety, called a "leaching" or "seeping" cesspool or catch basin, which is built of stone or brick, laid loosely together without mortar. Leaching cesspools allow the water to seep through the sides while retaining the solids, and will carry off the waste water without pipes if the ground is absorbent. We do not recommend a leaching cesspool, however, for the reason that there is always a chance of contamination and poisoning of drinking water if the well or spring is not far from it.

Assuming that you will have a tight cesspool, we shall first describe the inlet pipe leading to the cesspool from the kitchen. This pipe should have a pitch of at least ¼ inch to the foot. If your arrangements are the same as shown in the illustration, you will start the underground pipe line by calking a trap for the floor drain into a length of 2-inch soil pipe. On the end of this length of soil pipe, you will calk a 2-inch Y with the side opening turned up towards the 2-inch soil pipe coming down from the building. Into the upward turned branch of this Y, you will calk a short piece of soil pipe and into this another Y, into the side branch of which you will calk a clean out plug, which can be unscrewed, in order to rod out the pipe in case it becomes clogged. Then block up this entire length of pipe with the trap and Ys calked in it, in such a manner that the end of the 2-inch soil pipe coming down from the building will go into the hub of the upper Y branch. Be sure the underground pipe has a solid and even foundation, so that it will not sag anywhere after the dirt has been replaced on the top of it. Then continue your 2-inch soil pipe line outside the building with as many lengths as will be required to reach to the cesspool. Pitch the pipe ¼ inch to the foot. We advise that the cesspool be at least 25 or 30 feet from the building line.

At the cesspool, you will calk a piece of 2-inch soil pipe about 3 feet long into a soil pipe tee, and then calk the side opening of the tee into the end of the 2-inch pipe coming from the house. This gets the drainage into the cesspool. On the house end of the line, if you have a floor drain, as illustrated above, you will connect this drain into the hub of the trap. It may be necessary first to calk the floor drain into a piece of pipe long enough to reach from the floor level to the hub of the trap. If close enough, set the floor drain right down into the trap. With this, the 2-inch sewer in the ground is complete.

Next, you can start the 4-inch soil pipe for the bathroom drainage by calking a 4-inch eighth bend on the end of a Y branch, and into the other end of the Y branch, a 4-inch clean out plug. In the illustration, the 4-inch soil pipe coming down from the bathroom is shown calked into the side opening of this Y. Now lead the 4-inch soil pipe from the eighth bend before mentioned out just past the cesspool, where you will place in the pipe another 4-inch Y through the side opening of which the waste water from the cesspool can be received into your main line leading to the septic tank. Into the side opening of this Y, you will then calk a 4-inch eighth bend. A piece of soil pipe about 4 feet in length is then calked into a 4-inch tee in order to carry the outlet pipe down into the cesspool. Then into the side opening of this tee, you will calk a piece of 4-inch pipe long enough to reach from the tee to the eighth bend we have previously mentioned as being calked into the Y branch of your main sewer line.

Next, from the Y branch, you will continue the 4-inch soil pipe as far as the septic tank. Here a 4-inch tee is calked into a piece of soil pipe about a foot in length, and the side opening of this tee is calked into the 4-inch pipe coming from the house. Then to connect the first chamber of the septic tank with the second, you will calk a tee into a piece of soil pipe about a foot in length, and into the side of the opening, you will calk another piece of soil pipe about a foot in length.

Next the siphon is set in the second or siphon chamber, as shown in the illustration, and on the end of the siphon is calked a piece of soil pipe long enough to reach out to a tee just outside the septic tank. The side opening of this tee will look upwards towards the top of the tank. A piece of soil pipe is calked into the tee, long enough to reach up to just above the water level of the siphon chamber, and into the top of this pipe is calked an eighth bend, into which a short piece of pipe is calked to bring it just inside the siphon chamber. In this manner the overflow for septic tank is constructed.

Full instructions for building cesspools and septic tanks, with advice how to arrange for the final disposal of the sewage, are given on the three following pages.

DISPOSAL OF DRAINAGE OUTSIDE THE HOUSE

Including How to Build Cesspools and Septic Tanks and How to Lay Out Tile, Ditches and Filter Beds

Cesspools

A leaching cesspool can only be used when the soil is sandy or otherwise porous. It should never be placed nearer than 100 or 150 feet from the well or other source of water supply, and then only when the natural drainage is *away* from the water supply. It is built of loose brick or stone without the use of cement or mortar, about 4 feet wide by 6 feet deep. Figure 11 gives an idea of how to build it. The liquid seeps out into the surrounding soil, while the solid matter remains in the cesspool until removed.

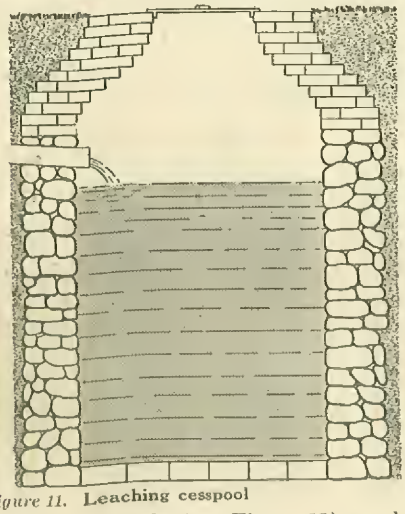


Figure 11. **Leaching cesspool**

Tight cesspools (see Figure 12) are built of brick, stone or concrete, and to be watertight should be cemented inside with a mixture of one part Portland cement to two parts of fine sand. The inlet and outlet pipes should be arranged somewhat as in Figure 12, the inlet running about a foot below the surface, while the outlet extends about half way down. The cesspool should be 12 to 15 feet from the house, and so placed that there will be no possibility of any leakage getting into your water supply. It should be at least 4 feet wide by 6 feet deep.

The waste water from the tight cesspool is conducted through glazed tile with cemented joints or through cast iron pipe to a flowing stream or other suitable outlet, or is disposed of by surface or subsurface drainage, as explained on pages 35 and 36.

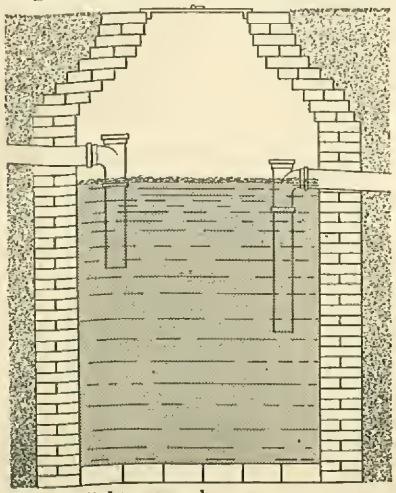


Figure 12. **Tight cesspool**

Septic Tanks

A septic tank is nothing but a concrete tank divided into two compartments, with a connection between them (see Figure 13). The sewage from the house runs into the first compartment. When enough has collected to rise to the outlet to the second compartment the liquid runs over into it, and when it rises to a certain height in the second compartment it is automatically siphoned out, and is finally purified by running it through a filter bed or distributing it in the ground.

The great difference between this tank and the ordinary cesspool is the natural process which takes place in the first compartment, due to the action of millions of bacteria which live on filth and thrive in the dark. In a cesspool the liquid runs off, leaving the solid sewage, which decomposes and gives off not only disagreeable odors, but millions of disease producing germs. In a septic tank the size of the first compartment is figured to hold the sewage that would naturally collect in eighteen to twenty-four hours, before it passes on into the second compartment. In the first or settling compartment a thick scum forms on top of the sewage, which keeps out the light and air. This is favorable to the growth and action of certain bacteria which cannot live in the air or light, and these turn the greater part of the sewage into a liquid that is about 40 per cent pure.

The first compartment of the septic tank should have a closed manhole cover, 42—1708¼. The pipe carrying the sewage from the house into it should extend down toward the bottom, so as not to disturb the scum at the top. In the eighteen to twenty-four hours that the sewage should remain in the settling compartment, it is nearly all turned into liquid form, and then runs over into the second or siphon compartment, which should have a manhole cover, 42—1709¼, with holes to admit air.

The object of the siphon in the second compartment is to empty it only from time to time whenever the liquid rises to a certain height above the siphon. This is to give the soil or filter bed, where the liquid is finally disposed of, time between emptyings to dry and air out. The time between discharges depends on the size of the siphon compartment, and should be regulated by the kind of soil or filter into which the liquid is run. If the soil is a heavy loam with poor natural drainage, there should be more time between discharges; therefore the second compartment should be larger. If the soil is very porous, or there is a decided fall to the land and the natural drainage is good, the discharge can be more frequent, and so the siphon compartment can be smaller. The soil or filter bed must not become waterlogged, otherwise the waste accumulates faster than the ground can dispose of it and ferments, giving off bad odors.

The table on the following page, taken from Bulletin No. 57 of the United States Department of Agriculture, gives the sizes of settling and siphon compartments and the corresponding size of siphon to be used under average conditions. The figures are given with the understanding that the inlet pipe and the pipe connecting the two compartments shall be 12 inches below the top of the tank, so that the surface of the sewage will be 12 inches below the tank roof. These dimensions may be varied slightly to suit local conditions, but care should be taken not to make the depth of the siphon chamber less than specified in the table on the following page.

Figure 13 shows the general shape and proportions of the septic tank. The exact location of the siphon need not be followed. It could be in the corner as well as in the middle of the end. Figure 13 shows a cross section of the tank, and illustrates the positions of the cast iron pipe connections.

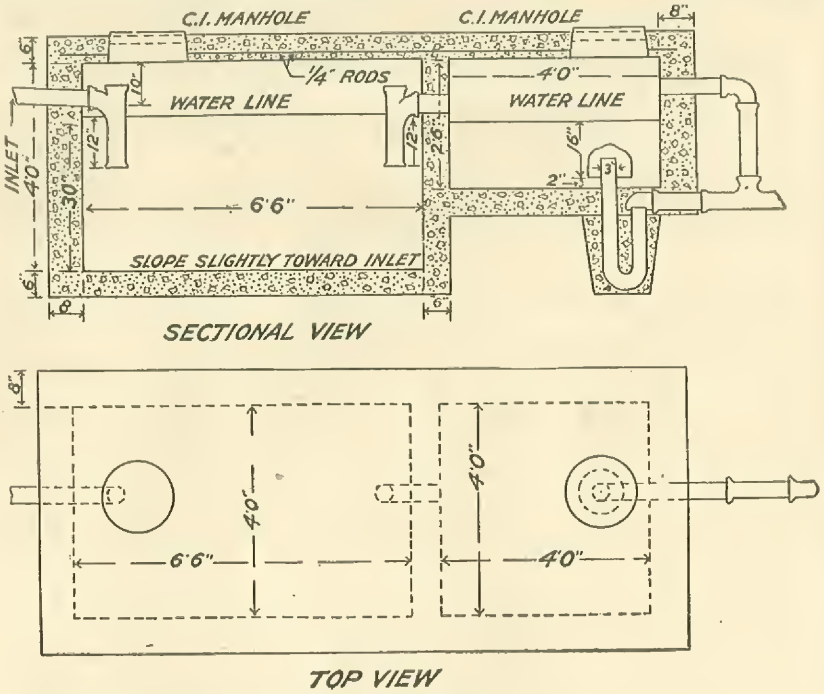


Figure 13. **Side view and top view of septic tank**

Photo No. 31. **A deeper hole for the siphon**

Location of Septic Tank

The septic tank, although practically air-tight and watertight, should be located as far from the house and the source of water supply as conditions will permit. This reduces the chances of any sewage getting into the drinking water, and prevents the nuisance of bad odors. Select a place where the ground is sufficiently level to provide for the overflow drainage described later. The fall from the house should not be too steep, either. At least the last 100 feet of sewer pipe from the house should not slope much more than 1/10 of an inch to the foot.

Materials and Fittings for Septic Tank

A septic tank should be made of concrete, brick or stone, as nearly watertight as possible. If you build it of concrete throughout, for six people you will need about three barrels of cement and a couple of loads of gravel. For a larger number of people you will of course need more material. Get just enough extra cement and sand to coat the sides and bottom to waterproof them, no matter what the tank is built of. See Figure 13, page 34, for general arrangements.

The fittings you need are a Hercules Automatic Siphon (see page 36). For the proper size to meet your conditions see the table on this page. You will need three sanitary tee branches, 42—1583¼, one for the end of the inlet soil pipe from the house, one for connecting the first and second compartments, and one to connect the emergency overflow with the pipe to the final drain; one quarter bend, 42—1568¼, to connect emergency overflow to the tank; two 5-foot lengths of double hub soil pipe, 42—1558¼, in the extra heavy 4-inch size, and enough extra heavy 4-inch single hub soil pipe, 42—1553¼, to lead from the house to the tank, with twice as many extra heavy eighth bends, 42—1562¼, in the 4-inch size as there are right angle turns in the pipe line. It takes two eighth bends to make a square turn.

Instead of the cast iron soil pipe, tees and bends above mentioned you may use 4 or 6-inch vitrified tile. We do not carry this tile.

For the top of the tank you need two iron manhole covers, one solid, 42—1708¼, for the settling compartment of the tank; the other, 42—1709¼, with holes in the top for the siphon chamber. It is also a good idea to have a pitcher spout pump, to which about 3 feet of 1½-inch pipe is screwed, in case you ever wish to empty the tank. The pipe and fittings will be found in our big General Catalog.

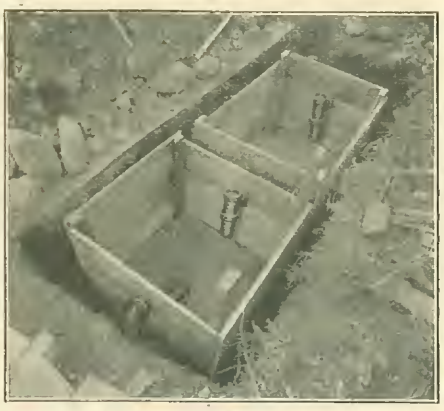


Photo No. 32. **Forms for tank**

How to Build the Septic Tank

For the size of your tank see table on this page. The tank can be constructed of concrete, brick or stone, and must be as watertight as possible. If you make yours of brick or stone, be sure you line the inside with cement to waterproof it. For a concrete tank a mixture of one part cement to two and a half parts of sand and four or five parts of broken stone or coarse gravel should be used. Make the walls 6 to 8 inches thick, the bottom 4 to 6 inches thick and the top or roof 6 to 8 inches thick, reinforced with ¼-inch iron rods or netting, or any old pipe or fence wire you may have. After the concrete has set the forms are removed and the inside of the tank coated with a mortar made of one part cement and two parts fine sand, to waterproof it.

Slope the bottom of the settling compartment to a point directly below the manhole so a pitcher spout pump, or some similar device, may be used for pumping out the sludge, should it become necessary.

The siphon compartment should be fitted with an overflow placed about 6 inches below the top of the tank to provide an outlet for the sewage in case the siphon becomes clogged. Dig a deeper hole where the siphon is to be placed, for this should be embedded in the concrete (Photo No. 31). Figure 13 on page 34 will show you just how the siphon rests in the concrete floor and the position of the overflow pipe in the wall above.

After you put the concrete for the floor into the pit, and it has set slightly, put in the forms for the side walls, with the intake, the compartment connection and also the emergency overflow pipe held in their proper positions by the forms (Photo No. 32). You are then ready to finish the concrete work (Photo No. 33).

Photo No. 33. **Ready to finish the concrete work**

Piping From House to Septic Tank

The pipe from the house to the tank should be 4-inch cast iron soil pipe, 42—1553¼, with calked lead joints, or 4 or 6-inch vitrified sewer tile with cemented joints. It should slope at the rate of about 1/10 of an inch to the foot. When the fall from the house to the tank is more than this it is advisable to lay the last 100 feet of pipe to a grade of 1/10 of an inch to the foot, so that the sewage may not flow too fast into the tank.

Surface Disposal of Drainage From Septic Tank

Where the soil is porous or sandy, and there is plenty of area available which is used for no other purpose, the sewage from

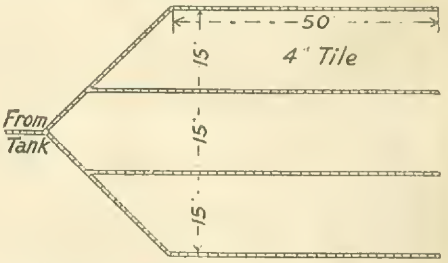


Figure 14. **Arrangement of field tile**

the septic tank may be discharged through 4-inch field tile laid end to end without any cement between them on the surface of the ground in gridiron or herringbone fashion (see Figure 14), or it may be conducted through distributing ditches as shown in Figure 15 on page 36.

This final drainage should be at least 200 feet from the house and from the water supply. About 500 square feet of area should be allowed for each person to be served. If the land has no natural drainage it should be tile drained.

If tile is used the rows should be from 12 to 15 feet apart. Figure 14 shows the most approved system of surface drainage. This is double, which permits you to shut off one set of rows and use the other set while the first section is drying and airing out. However, the double system is not absolutely necessary and only one set of rows may be used.

Dimensions of Septic Tanks

Number of Persons Served	Septic or Scum Chamber			Siphon Chamber						Size of Siphon to Order, Inches
				Sand Filter or Heavy Loam Disposal			Sandy or Porous Soil Disposal			
	Width, Inside	Length, Inside	Depth, Inside	Width, Inside	Length, Inside	Minimum Depth, Inside	Width, Inside	Length, Inside	Minimum Depth, Inside	
	Feet	Feet	Feet	Feet	Feet	Ft. In.	Feet	Feet	Ft. In.	
6	4	6	3½	4	3	2 4	3	2	2 4	3
8	4	6½	4	4	4	2 4	3	2½	2 4	3
12	4	7	5	4	5	2 5	3	4	2 5	4
15	4	8	5	4	6	2 5	3	4	2 5	4
25	4	10	5	4	6½	3 2	3½	4	3 2	5
35	4½	12	5	4	6½	3 2	3½	4½	3 2	5

To illustrate how to lay out a tile drainage bed, suppose there are five in your family. As about 500 square feet of area are needed for each person, you will then need 2,500 square feet of ground. Four rows of tile 12 feet apart, figuring in 12 extra feet on the outer side of each of the end rows, would give you a bed 60 feet wide. Divide the 60 into 2,500 and you get the length of a little over 41½ feet for your rows.

If you will conduct the sewage through ditches they should be from 4 to 6 feet apart, 4 inches deep by 8 inches wide, and the bed should cover the same area as for a surface tile drainage bed.

Subsurface Disposal of Drainage

A better way to dispose of the drainage is by subsurface distribution. In this method common farm tile are laid end to end with loose joints at a depth of 12 to 14 inches below the surface. The soil must be sandy or consist of gravelly loam, as the liquid will not seep away in clay or other heavy, close soils. The drain pipe from the septic tank to the subsurface system should be watertight and not less than 6 inches in diameter. It usually consists of 6-inch glazed tile with cemented joints, and should pitch toward the outlet at a rate of 12 inches to 100 feet.

A subsurface system should consist of two parts, branching off from a manhole as shown in Figure 14 on the opposite page. Gates or valves are placed in the manhole to turn the liquid into one or the other part as desired. The sewage should flow into each part alternately for a week. This allows one-half of the system to be thoroughly "air and light cleaned" while the other half is working. For sandy soils 35 to 40 feet of 3-inch tile per person is required for each part. Twice that amount is necessary for heavier soils.

In sandy soil the rows should be laid to a grade of 6 inches in 100 feet; in heavier soils, 2 or 3 inches to the 100 feet. The distance between the rows may be 6 feet in sandy soils, the tiles being laid straight as in Figure 14 on page 35. In heavier soils the rows should be placed farther apart, and if possible short branches should run out at right angles between the rows. This method of drainage is more expensive, but distributes the sewage more evenly through the soil.

If the surface soil is loose and porous, but has poor underdrainage, a second tile may be laid below the first at a depth of not less than 4 feet. If the water level in the ground is within 4 feet of the surface, it will be necessary to use a filter bed as described below, instead of the subsurface system.

Filter Bed Disposal of Drainage

If the soil is very compact or swampy, it is necessary to run the sewage from the septic tank over a filter bed (see Figure 16). The filtering material may consist of sand and gravel, crushed stone or cinders. The coarser material is put on the bottom, with a layer of smaller stone, gravel or cinders upon it, and fine sand or the screenings of the crushed stone or cinders on top.

The best results are obtained when the filter bed is from 3 to 5 feet deep. If but one bed is used, as shown in Figure 16, 30 square feet of surface per person should be allowed. Where two beds are used alternately, 15 square feet per person is needed in each bed.

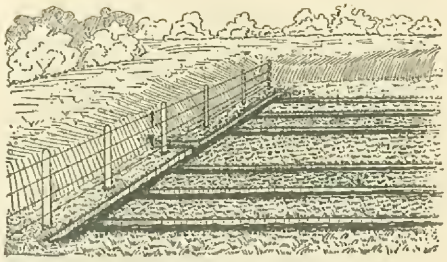


Figure 15. **Distributing ditches for drainage**

troughs, as shown in Figure 16, or may be conducted through 3 or 4-inch field tile. The troughs are made of 1x4-inch lumber, with openings ¼ inch high by 1 inch long cut into the sides on a level with the bottom. These openings should be from 8 to 12 inches apart and should alternate on the two sides of the trough. The troughs should be pitched about 2 inches per 100 feet. At the head of each trough, where it joins the head trough a gate should be placed. The different troughs may then be closed in turn, thus allowing part of the filter to dry and air out, while another part is in use. The flow should be changed from the first two troughs to the second two about once a week, and the part of the bed not in use raked over with a garden rake to a depth of several inches, so it may be purified by the air and sunshine while the other part is working.

The main distributing trough at the head of the bed should be made of 1x6-inch lumber, when serving six persons. The size should be increased when more are served.

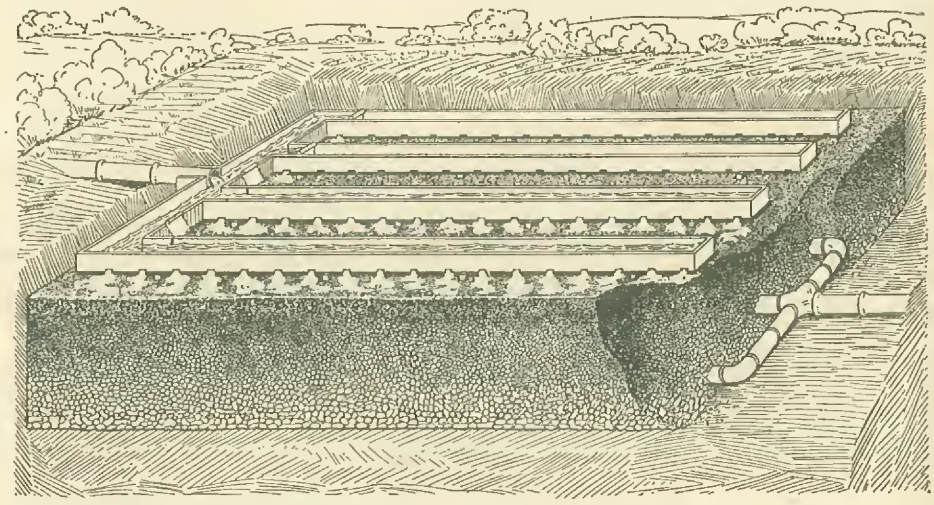


Figure 16. **Filter bed disposal of drainage**

The filter bed should be located where a fall of at least ¼ inch per foot from the septic tank can be had. A sufficient area is staked off, and dug out to a depth of 2 or 3 feet. Part of the earth is used for embankments 18 inches to 2 feet high to enclose the bed, making the total depth 3 to 5 feet.

If the underdrainage is poor a series of 4-inch drain tile should be laid in the bottom of the bed (see Figure 16) to carry off the liquid after it has trickled through the filtering material.

The sewage may be distributed over the surface of the bed by means of board

Photo No. 36. **Packing oakum in joint**

How to Cut Cast Iron Soil Pipe

To cut extra heavy soil pipe, first mark on the soil pipe where you wish to cut it off, and then lay it across a piece of 2x4 on the floor. The 2x4 will lie with its 4-inch side flat. Place the pipe with the mark where it is to be cut right in the center of the 2x4.

Then take a hammer and a cold chisel, and placing your knee on the soil pipe, use your knee to turn the pipe as you proceed to cut with the hammer and cold chisel. Photo No. 34 illustrates exactly how to do it.

We advise first going lightly around the pipe with the hammer and chisel. After you have then made a little impression, you can strike the chisel as hard as you wish. Remember, this applies only to extra heavy soil pipe, and not to the standard pipe, which must be handled in a different way. By the way, it is not necessary to cut all the way through the pipe, for after you have gone around it two or three times with a hammer and cold chisel, it breaks off very evenly, provided you have cut around in a straight line.

To cut standard soil pipe, we advise first making an impression with the edge of a file all around the pipe and then tapping it very lightly, as it is liable to crack if roughly handled.

How to Cut a Cast Iron Closet Bend

First mark or score the closet bend where you wish to cut it. Then set a piece of 2x4 up on its edge and have somebody hold the edge of the closet bend on which the collar is attached, and turn the bend as you cut it. Tap it around in one of the grooves where you want it to break two or three times with a hammer and cold chisel. Be careful not to hit it too hard. It will then readily break off.

Photo No. 37. **Pouring lead into hub**

How to Make a Calk Joint

The first thing to do is to start melting the lead. Place the pig lead or whatever lead you are going to use for this purpose in a melting pot, and then if you have a plumber's blast furnace, place the melting pot in the furnace after you have filled the furnace about three-quarters with gasoline. It is not absolutely necessary to have a blast furnace, although it is very handy to carry about wherever needed, thus saving running to and from any other fire. However, the lead can be melted in a melting pot by placing over a stove or gas range, or even an ordinary bonfire.

To light the plumber's blast furnace, first be sure the supply valve is shut. Then open the little air key on which the bulb is attached, which you will use to force air into the furnace. Next shut off the air key, opening the supply valve, and let enough gasoline in to just fill the bottom of the burner cup. Then close the supply valve tight.

Now light the gasoline in the burner cup and allow it to burn almost entirely out. Then turn on the supply valve. As the coil has been heated by the gasoline you have already burned, the new gasoline will be vaporized, that is, turned to a gas, as it passes through the coil.

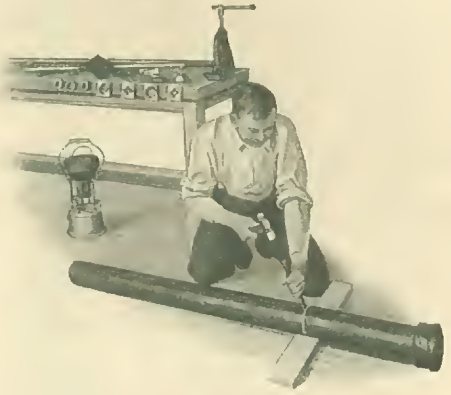


Photo No. 34. **Cutting soil pipe**

When the lead is hot, be sure you first heat the ladle by laying it alongside the melting pot before dipping it into the lead. If a cold ladle is dipped into the lead, an explosion is liable to result. Photo No. 35 shows lead and ladle being heated at the same time.

Photo No. 35. **Heating ladle at same time**

Photo No. 38. **Calking lead joint**

After the blast furnace is going, pack oakum in the hub, in which sets the piece of pipe you are to calk in, ramming it down tight with a yarning iron, as shown in Photo No. 36. The directions that follow are for an upright joint. Directions for calking a horizontal joint are given below, in a separate paragraph. Pack the oakum in tight up within about three-quarters of an inch of the top of the hub. Then dip the lead from the pot with the pouring ladle and pour it into the hub, as shown in Photo No. 37 until the lead is even with the top of the hub. Then use a hammer and calking iron to force the lead and oakum down to make the joint air and water tight. Be careful not to drive hard in any one spot. The practical way is to tamp it lightly all around before the final calking. In this way you will get a level joint. After tamping it lightly, calk it tight. Never strike the calking iron with all your might, however, as this is not necessary. Much better results are obtained by striking lighter blows and going around the joint several times. Photo No. 38 shows the lead joint being calked.

How to Calk a Horizontal Joint

Calking a horizontal joint requires a different procedure from calking an upright joint, because measures must be taken to prevent the lead from running out of the hub as it is poured in. First ram the oakum in tight, as described above for a vertical joint, tamping it to within three-quarters of an inch of filling. Then place an asbestos joint runner around the pipe, fitting it close up against the hub, as shown in Photo No. 39, and drawing it as tight as you can. Make sure that the runner fits so tight against the hub that there are no openings between the runner and the

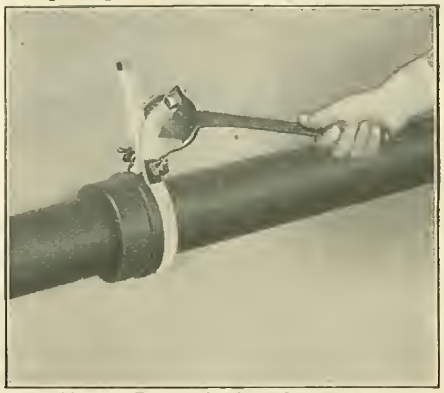


Photo No. 39. **Pouring lead into horizontal joint**

Photo No. 40.

hub that might permit the hot lead to run out when you start to pour it in at the top. Then take a full ladle of lead, so that the joint can be made at one pouring, and pour in at the top of the joint until full.

Finally, when the lead is cooled off and solidified, take off the asbestos rope and tamp the lead in with hammer and calking chisel.

How to Cut and Thread Wrought Iron Pipe

To cut wrought iron pipe, first mark on the pipe where it is to be cut, and then place the pipe in a pipe vise. (See Photo No. 40.) Then put the pipe cutter on the pipe, with the knife of the cutter directly on the mark. Tighten the cutter by turning the handle to the right. Then give the cutter one complete turn around the pipe. When it comes back to the point where you started, turn the handle another quarter turn and go around the pipe again. Repeat this procedure until the pipe is cut through; that is, gradually screw up the handle, but be careful not to tighten it too tight at any time.

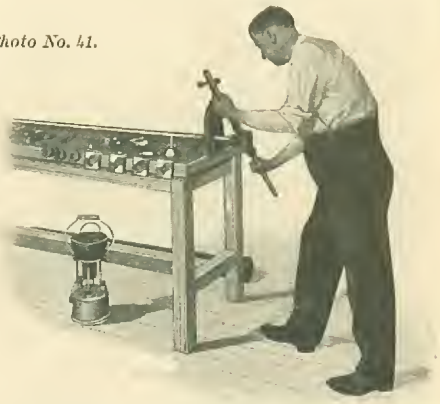
Threading wrought iron pipe is simple. The dies are all marked with the size pipe they are to cut. For instance, ¾-inch dies cut thread on a ¾-inch pipe, etc. In placing the die in the case of the stock, be sure to have the size of the die turned up towards the plate. If you always take this precaution you will be sure to have the die properly set in the stock. Then put in the guide. Never attempt to cut a thread without the guide, for if you do, it will make a very imperfect and crooked thread, which will rarely make a tight joint, even though it be screwed up the entire length of the thread.

After the vise is screwed down tight on the pipe, set the stock and die over the end of the pipe on which you wish to cut the thread, and push as hard as possible with the first couple of turns you give the stock in order to catch the thread. Photo No. 41 shows the position in which you do this. Remember, if you do not catch the thread the first time, you will have a smooth end on the pipe, which will make it difficult to catch a thread thereafter. Indeed, it is sometimes necessary to cut off the end of the pipe again before you can catch the thread. We repeat then: Use considerable strength in the first couple of turns of the stock, and push in a position shown in Photo No. 41.

After the thread is caught for one or two threads, it will not require any further pushing. All that will be necessary is to turn the stock around by the handle, as shown in Photo No. 42.

Photo No. 42.

Photo No. 41.



Be sure to keep the die well oiled. Indeed, if you omit the oil, you will make a bad thread, as well as take the temper out of the die. This will make the die useless in a short time.

Special Tool Outfit for Installing Plumbing

The tools contained in this list, with the exception of a hammer and saw, which we omitted for the reason that most people have these tools on hand, are sufficient to install any of the plumbing outfits appearing in this book.

While the plumber's blast furnace is very handy and adds considerable in simplifying the installing of the plumbing outfits, it is not an absolute necessity, for the reason that the lead can be melted in the melting pot over such fires as a stove, gas range, or, in fact, any ordinary bonfire.

42—Spec.	1	Set Stock and Dies Threading Pipe in sizes ⅜ to 1½ inches.
42—5970	1	No. 1 Pipe Vise.
42—5987	1	No. 2 Pipe Cutter.
42—6147	2	14-Inch Trimo Pipe Wrenches.
42—1768¼	1	Hercules Gasoline Bulb Blast Furnace.
42—1769	1	Melting Pot.
42—1780	1	3-Inch Pouring Ladle.
42—1825	1	Yarning Iron.
42—1831	1	Calking Chisel.
42—1832	1	Cold Chisel.

Directions for Installing 42—106¼ Frostproof Tank Flush Closet Outfit

The closet outfit consists of a galvanized tank, closet bowl, seat, valve with stem and connections, lead by-pass with connections, one piece 1¼-inch galvanized pipe 24 inches long, one 1¼x1-inch reducing street elbow, one piece 4-inch soil pipe 30 inches long, one half S trap and one lead ferrule, 4x8 inches.

The closet is regularly furnished with pipe and fittings for connecting to a waste pipe line 30 inches under ground and the supply pipe can be located 24 inches in the ground. The roughing-in measurements are as follows:

From the wall to which the flush tank is fastened to the center of the discharge opening for closet bowl, 16½ inches. From the wall to the outside edge of the seat, 28 inches. From the floor to the top of the seat, 17 inches. From the floor to the top of the flush tank, 5 feet 5 inches.

The trap is connected to the waste pipe line with a calked head joint if the waste pipe is cast iron, and with a cemented joint if the pipe is of glazed tile. Calked lead joints are made by first firmly packing oakum into the joint and then pouring molten lead on to the oakum, after which the lead is calked or driven down firmly into the crevices with a hammer and calking chisel. Cemented joints are made by mixing a mortar of one part Portland cement to two parts of clean sand and applying it to the joint. Cement should only be applied to glazed tile joints under ground as it is porous and shrinks when dried, thereby allowing openings through which sewer gases might escape. After connecting the trap to the sewer the piece of soil pipe is connected to it with a calked lead joint and into the hub of the soil pipe the lead ferrule is calked. This should bring the top of the ferrule about an inch above the floor on which the closet is to set. The top of the ferrule is beat over from the inside with a round stick or hammer handle until the edges lie flat upon the floor. The closet bowl is next placed over the ferrule, putty first being put between it and the ferrule, and it is then fastened to the floor with screws or bolts. The bottom of the valve stem is screwed on to a ½-inch supply pipe and the lead by-pass is connected to the tapping in the side of the soil pipe at one end and to the lower supply valve at the other. The upper supply valve is connected to the closet bowl, and the seat is attached by removing the seat hinge pin, placing the seat in position, putting the pins back and screwing down the set screw which holds the pin firmly in position. To the back of the upper valve the street elbow is connected; into this the piece of pipe is screwed and on to the end of the pipe the tank is connected. At the top of the tank is an eyelet for fastening it to the wall.

To regulate the flow of water loosen the set screws in the discs at the top of the two valve stems and turn them up or down so that when the seat is lowered the tank will fill but no water will run into the bowl, and when the seat is raised the supply will be closed and the water in the tank will flow into the bowl.

Be sure that supply pipe is free from sediment or other foreign matter before connecting it to the closet valve.

Roughing-In Measurements for Enamel Painted Steel Bathtubs 42—160⅓ to 42—163⅓.

From the side wall to the center of the discharge opening, 14½ inches. From the end wall to the center of the discharge opening, 5 inches. One supply opening on either side of the discharge opening, 3½ inches from the center of each supply opening to the center of the discharge opening; or, in other words, the supply openings will be 6 inches from the end wall also and 6 inches from center to center. From the floor to the center of the supply openings; that is, the openings in the bathtub, 16 inches. From the floor to the top of the tub, 20 inches. Measuring on the inside of the tub from the bottom of the tub to the top rim of the tub, 16 inches. The bibb holes in this tub are 3½-inch centers.

Roughing-In Measurements for Plumbing Fixtures

Bathtubs

42—181⅓, 42—191⅓, 42—183⅓ and 42—197⅓ Bathtubs

Side wall to center of waste, 16 inches.
End wall to center of supplies, 6 inches.
Center to center of supplies, 6½ inches.

Narrow Bathtub 42—185⅓

Side wall to center of waste, 14 inches.
End wall to center of supplies, 6 inches.
Center to center of supplies, 6½ inches.

Built-In Bathtubs 42—188⅓ and 42—180⅓

NOTE—End wall referred to in these dimensions for built-in bathtubs is the wall at head of tub in corner into which tub sets. Fixtures are placed at opposite end; that is, the end of tub which stands out in room. In determining the center points to drill holes in floor for supply and waste connections, however, it is necessary to calculate from wall at head end of tub, and dimensions are given accordingly.

Tub Size, 4½ Feet

Center to center of supplies, 7⅝ inches.
End wall to center of supplies, 4 feet 4¾ inches.
Side wall to center of waste, 13¼ inches.
End wall to center of waste, 4 feet 7 inches.

Tub Size, 5 Feet

Center to center of supplies, 7⅝ inches.
End wall to center of supplies, 4 feet 10¾ inches.
Side wall to center of waste, 13¼ inches.
End wall to center of waste, 5 feet 1 inch.

Tub Size, 5½ Feet

Center to center of supplies, 7⅝ inches.
End wall to center of supplies, 5 feet 4¾ inches.
Side wall to center of waste, 13¼ inches.
End wall to center of waste, 5 feet 7 inches.

Porcelain Enameled Lavatories

Lavatory 42—39001⅓ to Wall

Floor to center of waste, 19¾ inches.
Floor to center of supplies, 22 inches.
Center to center of supplies, 10½ inches.

Lavatory 42—49001⅓ to Floor

Wall to center of waste, 1⅛ inches.
Wall to center of supplies, 2¾ inches.
Center to center of supplies, 10½ inches.

Lavatory 42—39051⅓ to Wall

Floor to center of waste, 21¼ inches.
Floor to center of supplies, 22 inches.
Center to center of supplies, 12 inches.

Lavatory 42—49051⅓ to Floor

Wall to center of waste, 1½ inches.
Wall to center of supplies, 3¾ inches.
Center to center of supplies, 12 inches.

Lavatory 42—39056⅓ to Wall

Floor to center of waste, 17 inches.
Floor to center of supplies, 19⅜ inches.
Center to center of supplies, 16½ inches.

Lavatory 42—49056⅓ to Floor

Wall to center of waste, ¾ inch.
Wall to center of supplies, 4¼ inches.
Center to center of supplies, 16½ inches.

Lavatory 42—39061⅓, Size 18x24, to Wall

Floor to center of waste, 19½ inches.
Floor to center of supplies, 17 inches.
Center to center of supplies, 17 inches.

Lavatory 42—49061⅓, Size 18x24, to Floor

Wall to center of waste, 1½ inches.
Wall to center of supplies, 3⅝ inches.
Center to center of supplies, 17 inches.

Lavatory 42—39066⅓, Size 18x24, to Wall

Floor to center of waste, 17¾ inches.
Floor to center of supplies, 16½ inches.
Center to center of supplies, 12½ inches.

Lavatory 42—49066⅓, Size 18x24, to Floor

Wall to center of waste, ¾ inch.
Wall to center of supplies, 3¾ inches.
Center to center of supplies, 12½ inches.

Pedestal Porcelain Enameled Lavatories

Lavatory 42—39053⅓ to Wall

Floor to center of waste, 20¾ inches.
Floor to center of supplies, 21½ inches.
Center to center of supplies, 12 inches.

Lavatory 42—49053⅓ to Floor

Wall to center of waste, 1½ inches.
Wall to center of supplies, 3¾ inches.
Center to center of supplies, 12 inches.

Lavatory 42—39064⅓ to Wall

Floor to center of wnste, 19 inches.
Floor to center of supplies, 16½ inches.
Center to center of supplies, 12½ inches.

Lavatory 42—49064⅓ to Floor

Wall to center of waste, 1½ inches.
Wall to center of supplies, 3⅝ inches.
Center to center of supplies, 12½ inches.

Lavatory 42—39070⅓ to Wall

Floor to center of waste, 19 inches.
Floor to center of supplies, 15¾ inches.
Center to center of supplies, 11½ inches.

Lavatory 42—49070⅓ to Floor

Wall to center of waste, 5 inches.
Wall to center of supplies, 6¼ inches.
Center to center of supplies, 11½ inches.

Lavatory 42—39069⅓ to Wall

Floor to center of waste, 16 inches.
Floor to center of supplies, 17 inches.
Center to center of supplies, 16 inches.

Lavatory 42—49069⅓ to Floor

Wall to center of waste, 2 inches.
Wall to center of supplies, 6⅓ inches.
Center to center of supplies, 16 inches.

On this and the next page are given the so called roughing-in measurements for practically every plumbing fixture we sell. These measurements consist of distances between floor or walls and the openings for traps and faucets, also the distances between faucet holes, in fact, all the measurements necessary to enable you to put in your waste and supply pipes with the openings at the proper heights before your plumbing fixtures arrive. Or these measurements will enable you to leave openings for a sink or bathtub or any other plumbing fixture which you are not yet putting in, but which you may want to install later. All directions given in this book call for these roughing-in measurements, whenever necessary. Whenever you must refer to these measurements, merely look up the fixture under its catalog number.

If ever in doubt just what plan to follow in installation of any fixture, please feel free to write us and we will gladly give you whatever information you may require.

Corner Porcelain Enameled Lavatories

Corner Lavatory 42—39026⅓ to Wall

Corner to center of waste, 5⅜ inches.
Corner to center of supplies, 7¼ inches.
Floor to center of waste, 19 inches.
Floor to center of supplies, 21½ inches.

Corner Lavatory 42—49026⅓ to Floor

Each wall to center of waste, 4¼ inches.
Further wall to center of supplies, 7¼ inches.
Nearest wall to center of supplies, 3½ inches.

Corner Lavatory 42—39046⅓ to Wall

Corner to center of waste, 6⅝ inches.
Corner to center of supplies, 11½ inches.
Floor to center of waste, 21 inches.
Floor to center of supplies, 17½ inches.

Corner Lavatory 42—49046⅓ to Floor

Each wall to center of waste, 2 inches.
Further wall to center of supplies, 11½ inches.
Nearest wall to center of supplies, 3¾ inches.

Corner Lavatory 42—39041⅓ to Wall

From corner to center of waste, 5⅜ inches.
From corner to center of supplies, 11¾ inches.
From floor to center of waste, 18⅜ inches.
From floor to center of supplies, 19¼ inches.

Lavatory 42—49041⅓ to Floor

Each wall to center of waste, 5½ inches.
Further wall to center of supplies, 11¾ inches.
Nearest wall to center of supplies, 3¾ inches.

Water Closet Outfits

Siphon Washdown Closet, With Wood Tanks. Outfits 42—111¼, 42—116¼ and 42—118¼

From the finished wall that the tank sets on to the center of the closet bend, 12½ inches.

From the floor to the top of the tank, 2 feet 11½ inches.

From the wall to the front of the closet seat, 2 feet 4 inches.

Supplies, 2½ inches from the wall to the center and 6 inches from the center of the discharge opening to the center of the supply.

The tank is 7 inches wide by 21½ inches in length.

42—112¼ Siphon Washdown Closet, With Vitreous China Tank

From the finished wall that the tank sets on to the center of the closet bend, 13½ inches.

From the floor to the top of the tank, 3 feet 1½ inches.

From the wall to the front of the closet seat, 2 feet 4¾ inches.

The tank is 8 inches wide by 22½ inches in length.

High Tank Closet, Outfits 42—141¼ and 42—136¼

From finished wall that tank sets against to center of closet bend, 10 inches.

Supply pipe should be carried to wall immediately behind closet bowl and about 2 inches to the left of line of center of closet bend.

Siphon Jet Closet, With Wood Tank. Outfits 42—119¼, 42—120¼ and 42—125¼

From the finished wall that the tank sets on to the center of the closet bend, 12½ inches.

From the floor to the top of the tank, 3 feet 3 inches.

From the wall to the front of the closet seat, 26½ inches.

Supplies, 3½ inches from the wall to the center and 7 inches from the center of the discharge opening to the center of the supply.

The tank is 6 inches in width by 22 inches in length.

42—114¼ Siphon Jet Closet, With Vitreous China Tank

From the finished wall that the tank sets on to the center of the closet bend, 13¾ inches.

From the floor to the top of the tank, 3 feet 4½ inches.

From the wall to the front of the closet seat, 27¾ inches.

The tank is 8 inches in width by 22½ inches in length.

Perfection Bathroom Outfits

42—9214⅓ and 42—2214⅓

Bathtub. From side wall to center of waste opening, 15½ inches. From end wall to center of waste opening, 6 inches, if space will permit. If crowded for space, 4 inches will do. Supply pipe, one on each side of the waste opening, 3½ inches from the center of each supply to center of waste.

Lavatory for Outfit 42—9214⅓ has supply and waste pipes to wall. The roughing-in measurements on this lavatory are given under 42—39051⅓ on this page.

Lavatory for Outfit 42—2214⅓ has supply and waste pipes to floor. The roughing-in measurements on this lavatory will be found under 42—49051⅓ on this page.

Closet. This is the same as 42—111¼, the roughing-in measurements for which will be found on this page.

Gem Bathroom Outfits

42—9220⅓ and 42—2220⅓

Bathtub. From side wall to center of waste opening, 15½ inches. From end wall to center of waste opening, 6 inches, or, if space will not permit, 4 inches will do. Supply pipes, one on each side of waste opening, 3½ inches from center of each supply to the center of the waste.

Lavatory for Outfit 42—9220⅓. This lavatory has supply and waste pipes to the wall and is the same as 42—39061⅓, the roughing-in measurements for which will be found on this page.

Lavatory for Outfit 42—2220⅓ has waste and supply pipes to floor and is the same as 42—49061⅓, the roughing-in measurements for which will be found on this page.

Closet. This is the same closet as 42—114¼, the roughing-in measurements for which will be found on this page.

Ideal Bathroom Outfits

42—9217⅓ and 42—2217⅓

Bathtub. From side wall to center of waste opening, 15½ inches. Six inches from end wall to center of waste opening. Centers of the two supply openings to be 8 inches from end wall and 7 inches from center to center; that is, the center of each supply on either side of the waste opening will be 3½ inches from the center of the waste.

Lavatory for Outfit 42—9217⅓. This is the same as 42—49070⅓, the roughing-in measurements for which are given on this page.

Lavatory for Outfit 42—2217⅓. This is the same as 42—49070⅓, the roughing-in measurements for which will be found on this page.

Closet. This is closet 42—114¼, the roughing-in measurements for which will be found on this page.

Kitchen Grease Trap

42—700¼ Grease Trap—Waste to Floor—Vent to Wall

Wall to center of waste, 10 inches.
Floor to center of vent, 10¼ inches.
Floor to top of grease trap, 9½ inches.
Center of waste inlet to center of waste outlet, 13½ inches.

Two-Compartment Laundry Tubs

Laundry Tub 42—733⅓. Length, 48 In.

Supplies—6 inches from end of tub to center of first supply opening, 12 inches from center to center of supplies, 28 inches from floor to center of supplies. Distance between sets, 12 inches.

Waste—Distance from end left to right, 24 inches; distance from back wall to center of waste, 9 inches; distance from center of waste opening to floor, 13 inches.

Laundry Tub 42—734¼. Length, 54 In.

Supplies—6 inches from end of tub to center of first supply opening, 15 inches from center to center of supplies, 28 inches from floor to center, 12 inches distance between sets.

Waste—Distance from end left to right, 27 inches; distance from back wall to center of waste, 9 inches; distance from center of waste opening to floor, 13 inches.

Laundry Tub 42—735⅓. Length, 60 In.

Supplies—6 inches from end of tub to center of first supply opening, 18 inches from center to center of supplies, 28 inches from floor to center of supplies, 12 inches distance between sets.

Waste—Distance from end left to right, 30 inches; distance from back wall to center of waste, 9 inches; distance from edge of waste to floor, 13 inches.

NOTE—When an ordinary P trap is used, the waste opening would be 10 inches from floor to center.

Laundry Tub 42—790⅓. Length, 72 In.

Distance to center of first bibb hole, 6 inches.
All bibb holes from center to center, 12 inches.
From last bibb hole to end of tub, 6 inches.
Left end of tub to center of waste, 21 inches.
Distance between the two wastes, 27 inches.
From first (or twin) waste to end of tub, 24 inches.
From floor to center of bibb holes (using 16-inch legs), 36 inches.
From floor to center of waste opening, 5½ inches.
From back wall to center of waste, 4 inches.

Porcelain Enameled Sinks

Sink 42—39091⅓ to Wall

	In.	In.
Size	18x24	18x30
Floor to center of waste	20¼	20¼
Floor to center of supplies	39¼	39¼
Center to center of supplies	8	8
End of sink to center of supplies	12¼	15¼

	In.	In.	In.
Size	20x24	20x30	20x36
Floor to center of waste	20¼	20¼	20¼
Floor to center of supplies	39¼	39¼	39¼
Center to center of supplies	8	8	8
End of sink to center of supplies	12¼	15¼	18¼

Sink 42—39103⅓ to Wall

	In.	In.	In.
Length	44	48	52
Floor to center of waste	20¾	20¾	20¾
End of sink to center of supplies	10¼	10¼	11¼
End of sink to center of waste	14¼	14¼	15¼
Floor to center of supplies	39¼	39¼	39¼

Sink 42—39127⅓ to Wall

Floor to center of waste, 20¾ inches.
Floor to center of supplies, 39¼ inches.
Wall to center of supplies, 27 inches.
Wall to center of waste, 31 inches.

Sink 42—49127⅓ to Floor

Wall to center of waste, 47⅞ inches.
Floor to center of supplies, 39¼ inches.
Wall to center of supplies, 27 inches.
Wall to center of waste, 31 inches.

Sink 42—49091⅓ to Floor

	In.	In.
Size	18x24	18x30
Wall to center of waste	3⅞	3⅞
Floor to center of supplies	39¼	39¼
Center to center of supplies	8	8
End of sink to center of supplies	12¼	15¼

	In.	In.	In.
Size	20x24	20x30	20x36
Wall to center of waste	5	5	5
Floor to center of supplies	39¼	39¼	39¼
Center to center of supplies	8	8	8
End of sink to center of supplies	12¼	15¼	18¼

Sink 42—39101⅓ to Wall

	In.	In.	In.
Length	44	48	52
Floor to center of waste	20¾	20¾	20¾
Floor to center of supplies	39¼	39¼	39¼
End of sink to center of supplies	10¼	10¼	11¼
End of sink to center of waste	14¼	14¼	15¼

Sink 42—49101⅓ to Floor

	In.	In.	In.
Length	44	48	52
Floor to center of supplies	39¼	39¼	39¼
End of sink to center of supplies	10¼	10¼	11¼
End of sink to center of waste	14¼	14¼	15¼
Wall to center of waste	4⅞	4⅞	4⅞

Sink 42—49103⅓ to Floor

	In.	In.	In.
Length	44	48	52
Wall to center of waste	4⅞	4⅞	4⅞
End of sink to center of supplies	10¼	10¼	11¼
End of sink to center of waste	14¼	14¼	15¼
Floor to center of supplies	39¼	39¼	39¼

Corner Sink 42—39113⅓ to Wall

	In.	In.	In.
Length	44	48	52
End wall to center of waste	14¼	14¼	15¼
End wall to center of supplies	10	10	11
Floor to center of waste	20¾	20¾	20¾
Floor to center of supplies	39¼	39¼	39¼
Center to center of supplies	8	8	8

Corner Sink 42—49113⅓ to Floor

	In.	In.	In.
Length	44	48	52
Wall to center of waste	4⅞	4⅞	4⅞
End wall to center of waste	14¼	14¼	15¼
End wall to center of supplies	10	10	11
Floor to center of supplies	39¼	39¼	39¼
Center to center of supplies	8	8	8

Corner Sink 42—39123⅓ to Wall

	In.	In.	In.
Length	44	48	52
Floor to center of waste	20¾	20¾	20¾
End wall to center of waste	14¼	14¼	15¼
End wall to center of supplies	10	10	11
Floor to center of supplies	39¼	39¼	39¼
Center to center of supplies	8	8	8

Corner Sink 42—49123⅓ to Floor

	In.	In.	In.
Length	44	48	52
Wall to center of waste	4⅞	4⅞	4⅞
End wall to center of waste	14¼	14¼	15¼
End wall to center of supplies	10	10	11
Floor to center of supplies	39¼	39¼	39¼
Center to center of supplies	8	8	8

Sink 42—49129⅓ to Floor

Wall to center of waste, 47⅞ inches.
Floor to center of supplies, 39¼ inches.
Wall to center of supplies, 27 inches.
Center to center of supplies, 8 inches.

Sink 42—39129⅓ to Wall

Floor to center of waste, 20¾ inches.
Floor to center of supplies, 39¼ inches.
Wall to center of waste, 31 inches.
Wall to center of supplies, 27 inches.
Center to center of supplies, 8 inches.

Corner Sink 42—39132⅓ to Wall

	In.	In.	In.
Length	44	48	52
Floor to center of waste	20¾	20¾	20¾
Floor to center of supplies	39¼	39¼	39¼
Wall to center of waste	29¾	33½	36⅝
Wall to center of supplies	25¾	29¾	32¾
Center to center of supplies	8	8	8

Corner Sink 42—49132⅓ to Floor

	In.	In.	In.
Length	44	48	52
Wall to center of waste	4⅞	4⅞	4⅞
Floor to center of supplies	39¼	39¼	39¼
Wall to center of supplies	25¾	29¾	32¾
Center to center of supplies	8	8	8

Corner Sink 42—49134⅓ to Floor

	In.	In.	In.
Length	44	48	52
Wall to center of waste	4⅞	4⅞	4⅞
End wall to center of waste	29¾	33½	36⅝
End wall to center of supplies	25¾	29¾	32¾
Floor to center of supplies	39¼	39¼	39¼
Center to center of supplies	8	8	8

Corner Sink 42—39134⅓ to Wall

	In.	In.	In.
Length	44	48	52
End wall to center of waste	29¾	33½	36⅝
End wall to center of supplies	25¾	29¾	32¾
Floor to center of waste	20¾	20¾	20¾
Floor to center of supplies	39¼	39¼	39¼
Center to center of supplies	8	8	8

Corner Sink 42—39171⅓ to Wall

	In.	In.	In.
Size	20x24	20x30	20x36
End wall to center of waste	12¼	15¼	18¼
End wall to center of supplies	8⅝	11½	14⅜
Floor to center of waste	20¾	20¾	20¾
Floor to center of supplies	39¼	39¼	39¼
Center to center of supplies	8	8	8

Corner Sink 42—49171⅓ to Floor

	In.	In.	In.
Size	20x24	20x30	20x36
Wall to center of waste	4⅞	4⅞	4⅞
End wall to center of waste	12¼	15¼	18¼
End wall to center of supplies	8⅝	11½	14⅜
Floor to center of supplies	39¼	39¼	39¼
Center to center of supplies	8	8	8

Suggestions for the Care of Your Plumbing

Cleaning

Clean out your plumbing fixtures two or three times each year. Do not forget the overflow pipe of the lavatory, which collects a great deal of sediment, and also the closet flush tank.

Cleaning substances that contain grit or acid in any form should not be used on bathtubs, basins, sinks and other similar fixtures, as they injure and sometimes destroy the glazed finish, making it subject to absorption and discoloration. When the glazed finish of enamel and earthenware plumbing fixtures has not been injured or destroyed, satisfactory results in cleaning can be obtained by the use of a cloth saturated with kerosene (coal oil) or soap and water.

The interior of water closets and urinals, unless frequently cleaned, becomes incrusted. This can be remedied by applying with a swab a solution of muriatic acid.

To avoid trouble, do not use your water closet, lavatory or sink for garbage. And do not put burnt matches or other foreign substances in the wash bowls, sinks or similar fixtures.

To keep the plumbing system in a building in good working order, care should be taken that the faucets, drains and closets are kept in repair, for sometimes the neglect of repairing a sink faucet, ball cock in a closet tank or a sink trap, means that these fixtures will have to be replaced with new ones.

Never forget to turn off the water when there are repairs to be made in the plumbing. If there is a rumbling and rattling noise in the pipes when the faucets are opened or closed, as a rule it will be found that this is due to either of the following conditions: No air chamber or parts of the faucets or ball cocks are worn or loose. Or, where the pipe is run on the floor or ceiling joists, it may spring slightly against the joist when the faucets are opened or closed. This can be remedied by fastening the pipe to these joists.

The sweating of a pipe and the constant dripping of water is at all times annoying and may be remedied by covering the pipe with felt pipe covering, as this is often caused by the condensation of moisture in the air due to the difference in the temperatures of the pipe and the outside air, and by covering the pipe, it will prevent this. The covering also prevents the cold water pipe from freezing in cold weather, as well as enabling the hot water pipe to retain the heat a greater length of time.

On the previous pages we attempted to furnish illustrations that, with some slight changes, could be adapted to install plumbing fixtures under almost any reasonable conditions. Of course, the place in which you desire to install the plumbing may be somewhat different from any of the illustrations appearing on these pages. However, if there is any doubt in your mind as to installing your plumbing material, don't hesitate to write us and ask for help. Of course to simplify matters, we would suggest that you fill out one of our blank forms showing the arrangement of the fixtures and include any detail you think will be of benefit to our experts who will promptly figure and forward to you an estimate on the plumbing material with your questions properly answered.

You can get estimates from us without the slightest obligation to buy. Just send us a rough drawing of your building, being sure to give the basement height and show the arrangement of the fixtures.

After years of experience we have had firmly impressed upon us the fact that improper plumbing in a place of habitation is a serious hazard to health and even to life itself; consequently we urge that no matter what plumbing fixture you install where it is attached to a sewer, septic tank, cesspool or any other means of sewage disposal, you use individual traps on the fixtures, thereby protecting yourself from the gases entering your building from this source. Great care should also be exercised in installing these traps level so that the seal will not be broken, as would be the case if the trap were allowed to sag at either end.

It is also well to remember when considering plumbing for your home, that it is properly not a question of how cheaply it can be installed, but how well, as the plumbing in a house is one of the greatest conveniences and it is in almost constant use, so we would suggest that when ordering your plumbing fixtures and material, you have it as correct as we urge that you have the installation. As all our enameled ironware is made in our own factory, we guarantee it to be first class in quality, workmanship, design and finish. We do not handle or sell second class or "B" grade material, and by manufacturing our own enameled ironware, our customers reap the profit that would otherwise go to the middleman.

With the directions given in this booklet it is a simple matter to install plumbing material, especially when the plumbing fixtures that we furnish are threaded for iron pipe connections, thereby making it unnecessary to use lead pipe, unnecessary to know how to wipe or solder joints. Anyone can cut and thread wrought pipe and screw it together. Cast iron soil pipe is very easy to calk, as explained on page 37. No one, regardless of where he lives, need be without all the comforts and conveniences that can be had in a large city. If water pressure from a central station is not available in your locality, you can obtain even pressure by using our Ever Ready Water Supply System, described on pages 24 to 28. This system insures a constant supply of water under pressure. We employ plumbing engineers who have had years of experience in laying out and installing complete plumbing systems. These engineers are at your service, and will furnish you with any information you may desire without obligation to you and will also send a plan or working drawing after receiving the order.

Use an Ever Ready Water Supply Outfit

Where the water is not supplied by the city or a water company, the very best method of obtaining water under pressure ample for fire protection as well as domestic use, also barns, outbuildings, etc., is by using an Ever Ready Water Supply Outfit. There are a good many reasons why a pressure tank is well worth the difference in cost over a tank in the attic.

The pressure tank being a steel tank and generally placed in the cellar, the chance of freezing is almost eliminated. The pressure tank produces a high pressure, quite as much as city waterworks; hence its value in case of fire. As a fire protector alone, the pressure system gives you enough added protection and advantage to warrant putting it in. When the pressure system is used, it is an easy matter to place faucets in convenient places on the outside of your building and in the ground so that in case of fire a hose could be readily attached. Another great advantage of the pressure system is that it delivers aerated water which is produced by pumping air into the tank with the water. The pumping of air into the water keeps it fresh and bubbling with life. You do not endanger cracking the plaster or ceiling as is the case where an attic tank is used, for when a tank in the attic is filled with water, there is a great strain on the ceiling joists and, furthermore, if through any cause the tank should spring a leak, it would subject the building and furnishings to considerable damage.

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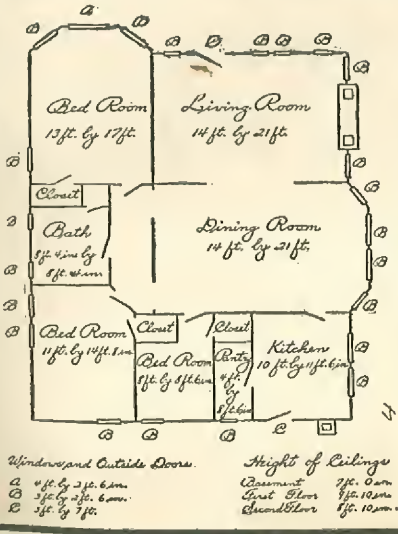
We cut and thread all the larger size pipe for you to the exact length required, and all you have to do is to screw the pipe together. The smaller branch pipes leading to the radiators are easily cut and threaded and it is really surprising how easy the work becomes after the job is once started.



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You can get an estimate from us without the slightest obligation to buy. Just send us rough drawings of your basement, first, second and any other floors (drawings similar to the outline shown here). Give the dimensions of each room, the height of the ceilings, the location and size of the doors, windows, stairways and chimneys. Mark where you would like to place furnace or boiler, registers or radiators (if you have any preferences). Also tell us which kind of heating you prefer. We will then give you an itemized estimate of the material necessary to properly fit up your place with a plant which we will guarantee to give perfect satisfaction. Estimates cheerfully furnished free, and you are placed under no obligation to buy.

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